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Public Law 88-444 asked the Commission to identify, assess, describe, and define aspects of technological change and to recommend specific legislative and administrative steps which should be taken by federal, state, and local governments. The Commission was to concern itself for 1 year with the coming decade. Their examination covered (1) The Pace of Technological Change, (2) Creating an Environment for Adjustment to Change--Employment and Income, and (3) Technology and Unmet Human and Community Needs. Recommendations included (1) a program of public service employment in which the government would be an "employer of last resort" for hard core unemployed, (2) an income floor to guarantee economic security of families, (3) compensatory education for persons in disadvantaged environments, (4) the creation of a national computerized job-man matching system, (5) a shift in the administration of employment services from the states to the federal government, (6) the permanent extension of experimental relocation assistance for families stranded in declining areas, (7) exploration of a system of social accounts to make possible assessment of the relative costs and benefits of alternative policy decisions, and (8) continuous study of national goals and evaluation of our national performance in relation to such goals. Appendixes are VT 003 960, VT 003 961, VT 005 794-VT 005 797.

Report of the National Commission on
Technology, Automation, and Economic Progress

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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VT003962

TECHNOLOGY
and the
AMERICAN ECONOMY

Volume 1
February 1966

ED023803

To the President and the Members of the Congress:

We have the honor to present the report of the National Commission on Technology, Automation, and Economic Progress. This Commission was established by Public Law 88–444, which was approved by Congress on August 5, 1964, and signed by the President on August 19, 1964.

The Commission was appointed by the President in December 1964, and the appointments were approved by the Senate on January 27, 1965. The Commission has met in monthly 2-day sessions beginning in January 1965. It has heard many witnesses; it has received reports from numerous organizations and other individuals; and it has had the assistance of a highly competent and dedicated staff.

The report is supplemented by extensive supporting documents, including reports on the many studies conducted by experts at the request of the Commission and statements made by various interested organizations and individuals. Though the Commission does not necessarily endorse the information and views of these supplementary documents, it considers them of value and has directed their publication.

The content of this report has been developed through lengthy discussions by the members of the Commission and represents their combined judgment and general agreement. It does not necessarily represent their individual endorsement of the details of each finding. On a very few of the findings, individual members have expressed their opinions in footnotes.

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NATIONAL COMMISSION ON TECHNOLOGY, AUTOMATION, AND ECONOMIC PROGRESS

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Joseph A. Beirne
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[1] Appointed July 31, 1965, following the death of John I. Snyder, Jr.

[2] Appointed Aug. 18, 1965, following the resignation of Anthony J. Celebrezze.

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The Commission wishes to express its sincere appreciation for the effective and generous assistance and cooperation of many professional and trade associations, labor organizations, and individual consultants. We are equally grateful for the help and interest of numerous officials and agencies of the Federal Government who have given freely of their time to provide data and to assist and advise the Commission. In particular, we would acknowledge our debt to the members of the Interagency Advisory Committee and to its cochairmen, W. Willard Wirtz, Secretary of Labor, and John T. Connor, Secretary of Commerce. Office space and administrative support were provided by the Department of Labor.

The Commission wishes to thank the members of the staff who have worked effectively and cheerfully, have met deadlines punctually, and have contributed enormously to the thinking of the Commission. The staff members and especially the executive secretary, Dr. Garth L. Mangum, deserve high commendation for excellent work.

Every member of the Commission is grateful for the stimulus and the new perspectives that each has gained from the work of the group.

It is with profound sadness that we report the death on April 24, 1965, of one of our valued members, John I. Snyder, Jr. However, we were pleased to have as his successor Thomas J. Watson, Jr. Although Mr. Watson took part in the Commission's discussions and deliberations he dissociated himself from any recommendations involving computers because IBM manufactures and sells them.

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INTRODUCTION[1]

Future historians will probably describe our time as an age of conscious social change. The change we are witnessing includes the rapid growth of population, the massive flow of peoples from rural areas to the cities, the steady growth of national wealth and income, the rise of oppressed and submerged peoples, the spread of mass education, the extension of leisure, the venture into space, and the frightening increase in the destructiveness of military weapons. Change is worldwide in scope. Not all nations or regions are participating to the same degree or have reached the same stage, but almost no part of the world has been left untouched.

It is easy to oversimplify the course of history; yet if there is one predominant factor underlying current social change, it is surely the advancement of technology. Technological change includes new methods of production, new designs of products and services, and new products and new services. Technological change is exemplified by the automation of a machine tool, reorganization of an assembly line, substitution of plastics for metals, introduction of a supersonic transport, discovery of a new method of heart surgery, teaching of foreign languages by electronic machines, introduction of self-service into retailing, communications by satellite, bookkeeping by electronic computer, generation of electricity from nuclear energy, introduction of frozen foods and air conditioning, and the development of space vehicles and nuclear weapons.

As men have learned the power of applying thought and experiment to the attainment of human ends and have systematically exploited the possibilities of pure science and technology, a steady flow of new methods, new designs, and new products has resulted.

There has been widespread public recognition of the deep influence of technology upon our way of life. Everywhere there is speculation about the future possibilities for human life, and much public attention is directed toward scientific and technical trends. The vast majority of people quite rightly have accepted technological change as beneficial. They recognize that it has led to better working conditions by eliminating many, perhaps most, dirty, menial, and servile jobs; that it has made possible the shortening of working hours and the increase in leisure; that it has provided a growing abundance of goods and a continuous flow of improved and new products; that it has provided new interests and new experiences for people and thus added to the zest for life.

On the other hand, technological progress has at various times in history, one of them in recent years, raised fears and concerns which have led to some questioning of its benefits. One of these concerns has been the fear of annihilation by "the bomb." Another concern has been the apparently harmful influences of modern technology on the physical and community environment—leading to such problems as air and water pollution, inadequate water supply, unsatisfactory solid waste disposal, urban congestion and blight, deterioration of natural beauty, and the rapid depletion of natural resources. Another concern has been the apparently harmful influence of urban, industrial, and technical civilization upon the personality of individual human beings—leading to rootlessness, anonymity, insecurity, monotony, and mental disorder. Still another concern, perhaps the one most responsible for the establishment of the Commission, has arisen from the belief that technological change is a major source of unemployment. This concern has been fostered by the substantial and persistent unemployment during the period 1954–65. The fear has even been expressed by some that technological change would in the near future not only cause increasing unemployment, but that eventually it would eliminate all but a few jobs, with the major portion of what we now call work being performed automatically by machine.

---

[1] This introduction was written by the Chairman at the request of the Commission, but is not part of the official report of the Commission.

As a nation we have willingly accepted technological change because of its many benefits, but we have never been fully successful in dealing with its problems, even when the pace of technological advance and the growth of the labor force were less rapid than today.

The relatively high postwar labor productivity, much of it due to technological change, combined with the current and future high rate of labor force growth increases dramatically the number of jobs which must be created continually to achieve and maintain full employment. During the period since 1947 output per man-hour in the private economy has increased at the rate of about 3 percent a year as compared to 2 percent a year in the previous 35 years. It is possible that this higher rate of productivity growth will continue, and it may even accelerate in the decade ahead. Moreover, in the next 5 years, the labor force will increase by approximately 1.9 percent a year, and the increase beyond that time will be almost as fast. This figure compares with 1.5 percent a year in the last half of the 1950's.

The social costs and dislocations flowing from past technological changes underscore the need to prepare for the changes that lie ahead. For instance:

> Modern farm technology—ranging from the cottonpicker and huge harvesting combines to chemical fertilizers and insecticides—has resulted in rapid migration of workers to the cities and has contributed to serious urban problems.
>
> The technological revolution in agriculture has compounded the difficulties of a large section of our Negro population. Pushed out of rural areas, many of them have migrated to cities in search of livelihood. But they have arrived just when deficient economic growth rates have increased the competition for available jobs, and when advancing technology has been reducing the numbers of the semiskilled and unskilled manufacturing jobs for which they could qualify. Despite improvements in the past 2 years, there are 700,000 fewer factory production and maintenance jobs than at the close of the Korean war.
>
> The closing of obsolete plants and facilities as a result of technological and economic changes has thrown some whole communities—particularly one-industry communities—into economic distress. The fact that coal mining employment fell by 46 percent in 7 years between 1947 and 1954 illustrates the problem. Appalachia is evidence of our failure to cope with it.

> Technological change has upset the delicate balances of our environment. Pollution of air and water bedevil our metropolitan areas in which 70 percent of our population lives, while the growing urban population has intensified problems of urban transportation, housing, education, health, and public services.
>
> Despite the great wealth that technology enables us to produce, in 1963 nearly 35 million Americans were still below the poverty level (7.2 million families and 1.8 million persons living alone). Approximately half of these people lived in family units whose breadwinners were employed full-time.

Technology is not a vessel into which people are to be poured and to which they must be molded. It is something to be adapted to the needs of man and to the furtherance of human ends, including the enrichment of personality and environment.

Technology has, on balance, surely been a great blessing to mankind—despite the fact that some of the benefits have been offset by costs. There should be no thought of deliberately slowing down the rate of technological advancement or hampering the freedom of discovery. The task for the decades ahead is to direct technology to the fulfillment of important human purposes. Much of this technology will be derived from the social sciences and the humanities as well as the physical and biological sciences. It will be concerned with such values as individuality, diversity, and decentralization rather than conformity, massive organization, and concentration. It will be directed toward human, environmental, and resource development rather than the proliferation of conventional consumer goods. It will seek to make work more meaningful rather than merely more productive.

In the new technology, machines and automated processes will do the routine and mechanical work. Human resources will be released and available for new activities beyond those that are required for mere subsistence. The great need is to discover the nature of this new kind of work, to plan it, and to do it. In the longer run, significant changes may be needed in our society—in education, for example—to help people find constructive and rewarding ways to use increasing leisure.

Our problem is to marshall the needed technologies, some of which are known and some not yet known. If we are to clean up our environment, enhance human personality, enrich leisure time, make work humanly creative, and restore our natural resources, we shall need inventiveness in the democratic decision making process as well as in the needed technologies. We shall also need to find creative combinations of public and private initiative, as some of the goals of the future may not be achievable through private initiative; leadership will be required by government—Federal, State, and local—with important roles to be played by universities and nonprofit institutions.

It was in the setting of the considerations outlined above that the legislation establishing the Commission was enacted in August 1964. Since that time, conditions have changed and public concerns have been modified. As a result of the tax cuts and other fiscal policies adopted beginning in early 1964, unemployment has been reduced from 5.4 percent to about 4 percent at present. With the intensification of the war in Vietnam, the prospects are for still further cuts in unemployment, and concern is expressed about inflation. However, despite the recent improvement in the employment situation, the basic issues which the Commission was asked to consider are just as relevant and urgent as they were a year ago; and they will continue to be relevant and urgent for many years. The Commission's basic recommendations have not been altered by the turn of recent events.

In the legislative charge (as expressed in Public Law 88–444 creating the Commission), the Congress gave the Commission the following mandate:

> (a) To identify and assess the past effects and the current and prospective role and pace of technological change;
>
> (b) To identify and describe the impact of technological and economic change on production and employment, including new job requirements and the major types of worker displacement, both technological and economic, which are likely to occur during the next 10 years; the specific industries, occupations, and geographic areas which are most likely to be involved; and the social and economic effects of these developments on the Nation's economy, manpower, communities, families, social structure, and human values;
>
> (c) To define those areas of unmet community and human needs toward which application of new technologies might most effectively be directed, encompassing an examination of technological developments that have occurred in recent years, including those resulting from the Federal Government's research and development programs;
>
> (d) To assess the most effective means for channeling new technologies into promising directions, including civilian industries where accelerated technological advancements will yield general benefits, and assess the proper relationship between governmental and private investment in the application of new technologies to large-scale human and community needs;
>
> (e) To recommend, in addition to those actions which are the responsibility of management and labor, specific administrative and legislative steps which it believes should be taken by the Federal, State, and local governments in meeting their responsibilities (1) to support and promote technological change in the interest of continued economic growth and improved well-being of our people, (2) to continue and adopt measures which will facilitate occupational adjustment and geographical mobility, and (3) to share the costs and help prevent and alleviate the adverse impact of change on displaced workers.

The Commission was asked to concern itself with only the next decade. It has not attempted to deal with the distant future. Nevertheless, the scope of the mandate was wide and the issues both complex and difficult. But the Commission has attempted, within the limits of its 1-year life, to answer the questions raised and to offer recommendations as requested.

Howard R. Bowen,
Chairman.

THE PACE OF TECHNOLOGICAL CHANGE*[1]

It has become almost a commonplace that the world is experiencing a scientific and technological revolution. Stock phrases—knowledge explosion, second industrial revolution, automation revolution—express this belief. According to one extreme view, the world—or at least the United States—is on the verge of a glut of productivity sufficient to make our economic institutions and the notion of gainful employment obsolete. We dissent from this view. We believe that the evidence does not support it, and that it diverts attention from the real problems of our country and the world. However, we also dissent from the other extreme view of complacency that denies the existence of serious social and economic problems related to the impact of technological change.

There is no doubt that the pace of technological change is uneven from decade to decade and century to century. Past trends and current prospects suggest that the present is, and the near future will be, a time of rapid technological progress. The combination of increased expenditure on research and development, extended and deepened education, continued urbanization, and improved communications has led to spectacular accomplishments in science and engineering. But this is as far as we are prepared to go. It is beyond our knowledge to know whether the computer, nuclear power, and molecular biology are quantitatively or qualitatively more "revolutionary" than the telephone, electric power, and bacteriology.

Our study of the evidence has impressed us with the inadequacy of the basis for any sweeping pronouncements about the speed of scientific and technological progress. There are, however, a few measurable aspects of the process about which reasonable statements can be made. Our broad conclusion is that the pace of technological change has increased in recent decades and may increase in the future, but a sharp break in the continuity of technical progress has not occurred, nor is it likely to occur in the next decade.

There appears to be no direct method of measuring the rate of technological change through the number of significant innovations or their economic effects.

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*For general comments on report by several Commission members, see pp. 6—7.

[1] Studies were prepared for the Commission's consideration on most of the major points in this report. The Commission appreciates the efforts of the experts who prepared these studies and has directed their publication in volumes supplementary to the report. We believe the information and views provided in them are of value, but we endorse the findings of none.

The (†) symbol in footnotes throughout the report is used to indicate studies prepared for the Commission. In relation to this section, see Bureau of Labor Statistics, *Industry Productivity Projections: A Methodological Study* (†); Frank Lynn, *An Investigation of the Rate of Development and Diffusion of Technology in our Modern Industrial Society* (†); and Edwin Mansfield, *Technological Change: Measurement, Determinants, and Diffusion* (†).

Therefore, indirect measures must do. The most useful appear to be indexes of productivity and productivity growth, particularly output per man-hour (the volume of final output of goods and services produced in a year divided by the number of man-hours worked in the year). Output per man-hour is not, of course, a measure of technical progress alone. It depends also upon the education, skill, and health of workers and managers and upon the plant and equipment with which they work. Nevertheless, any great change in the overall rate of technological progress capable of having major effects on the economy is most likely to be reflected in output per man-hour.

The most inclusive useful index of productivity is output per man-hour in the whole private economy. In the 35 years before the end of the Second World War, output per man-hour in the private economy rose at a trend rate of 2 percent a year. But this period includes the depression decade of the 1930's. Between 1947 and 1965 productivity in the private economy rose at a trend rate of about 3.2 percent a year. If agriculture is excluded, the contrast is less sharp, with the rate of increase 2 percent a year before the war, and 2.5 percent after (see figure 1).[2]

Some attempts have been made to refine a measure of the effects of technological change by allowing for the influence of better educated workers and increasing capital investment. The results are necessarily imprecise, and show, as would be expected, that not all the gain in productivity can be attributed to changing technology. They do suggest, however, some acceleration in the rate of progress, and give a picture consistent with the simpler index of output per man-hour.

If this increase in the rate of productivity growth does not square with the assumption that a veritable technological revolution has occurred, the increase itself is nevertheless substantial. Growth at 2 percent a year doubles in 36 years; growth at 2.5 percent a year doubles in 28 years; growth at 3 percent a year doubles in about 24 years. The notion that the product of an hour of work can double in 24 years—not much more than half a working lifetime—is quite enough to justify the feeling of continuous change that is so much a part of the contemporary environment. The time scale has indeed shrunk visibly.

One other important aspect of innovation is at least partially amenable to measurement. The economic impact of a scientific or engineering discovery begins not when the discovery is first made, not even when it is first commercially introduced, but only later when the resulting new product or new process receives widespread commercial acceptance. The process of development and diffusion through industry takes time—sometimes a long time. The steam locomotive and the diesel coexisted for at least 30 years; the DC–3 introduced in the

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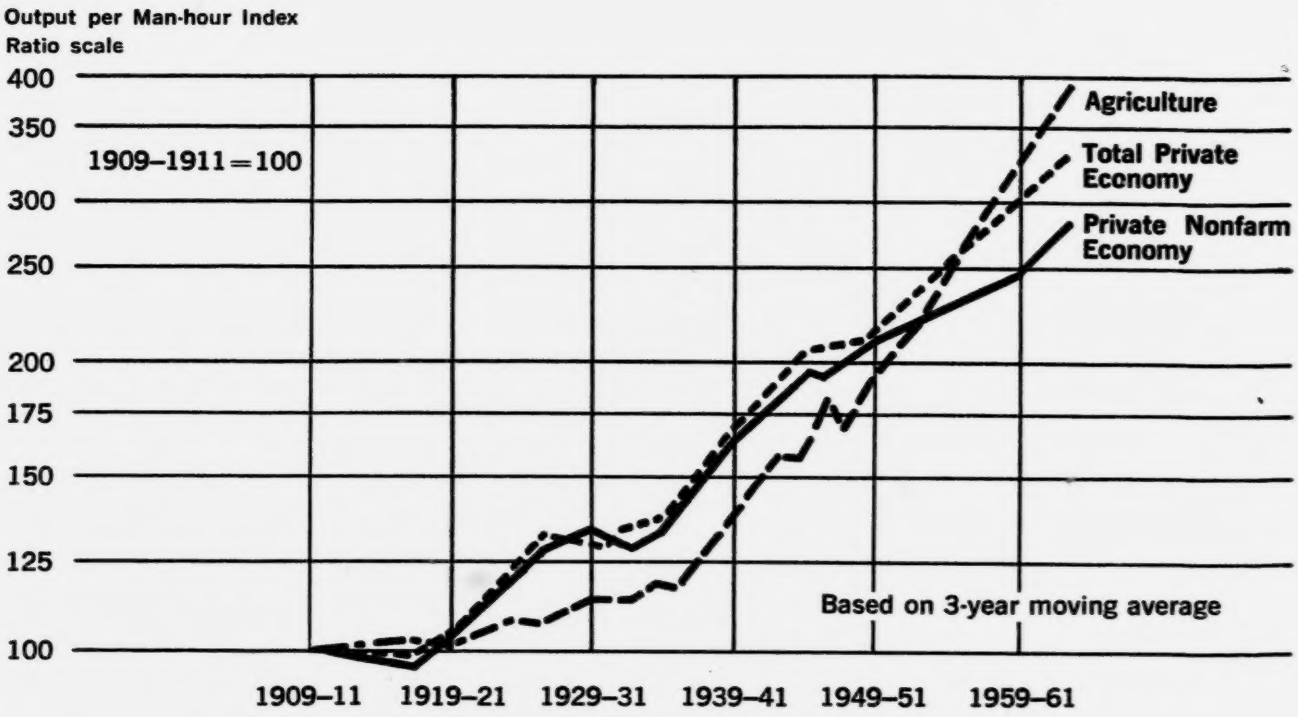
[2] We give the figure without agriculture not to suggest that agricultural productivity does not matter, but only to isolate the productivity trend in "industry." For manufacturing alone, the postwar rate of productivity gain was 2.6 percent per year.

Figure 1. **INDEXES OF OUTPUT PER MAN-HOUR**
Total Private, Farm, and Private Nonfarm Economy, 1909–65



Source: Unless otherwise indicated, all charts are compiled from information provided by the U.S. Department of Commerce and Bureau of Labor Statistics, U.S. Department of Labor.

1930's is still flying. Studies made for the Commission confirm the common belief that things happen faster nowadays: the lag between discovery and commercial application has shortened. It is nevertheless still substantial.

Lynn concluded from an examination of a limited sample of 20 major technological innovations during the last 60 to 70 years that every step in the process of technological development had accelerated. The typical time between a technical discovery and recognition of its commercial potential had fallen from about 30 years before the First World War to 16 years between the wars, and 9 years after the Second World War. The additional time required to convert these basic technical discoveries to initial commercial application had decreased from about 7 years to about 5 years (see table 1). The rate at which new technologies diffused throughout the economy after their introduction had speeded up considerably between the early part of the century and the interwar period, with only slight further acceleration after 1945. Technological innovations with consumer applications were developed and diffused nearly twice as fast as those with industrial applications. The implied shrinking of the time scale is quite consistent with the productivity figures already given.

Table 1.—**Average rate of development of selected technological innovations** [1]

Factors influencing the rate of technological development	Mean lapsed time (years)		
	Incubation period [2]	Commercial development [3]	Total development
TIME PERIOD			
Early 20th century (1885–1919)	30	7	37
Post-World War I (1920–44)	16	8	24
Post-World War II (1945–64)	9	5	14
TYPE OF MARKET APPLICATION			
Consumer	13	7	20
Industrial	28	6	34
SOURCE OF DEVELOPMENT FUNDS			
Private industry	24	7	31
Federal Government	12	7	19

[1] Based on study of 20 major innovations whose commercial development started in the period 1885–1950.

[2] Begins with basic discovery and establishment of technical feasibility, and ends when commercial development begins.

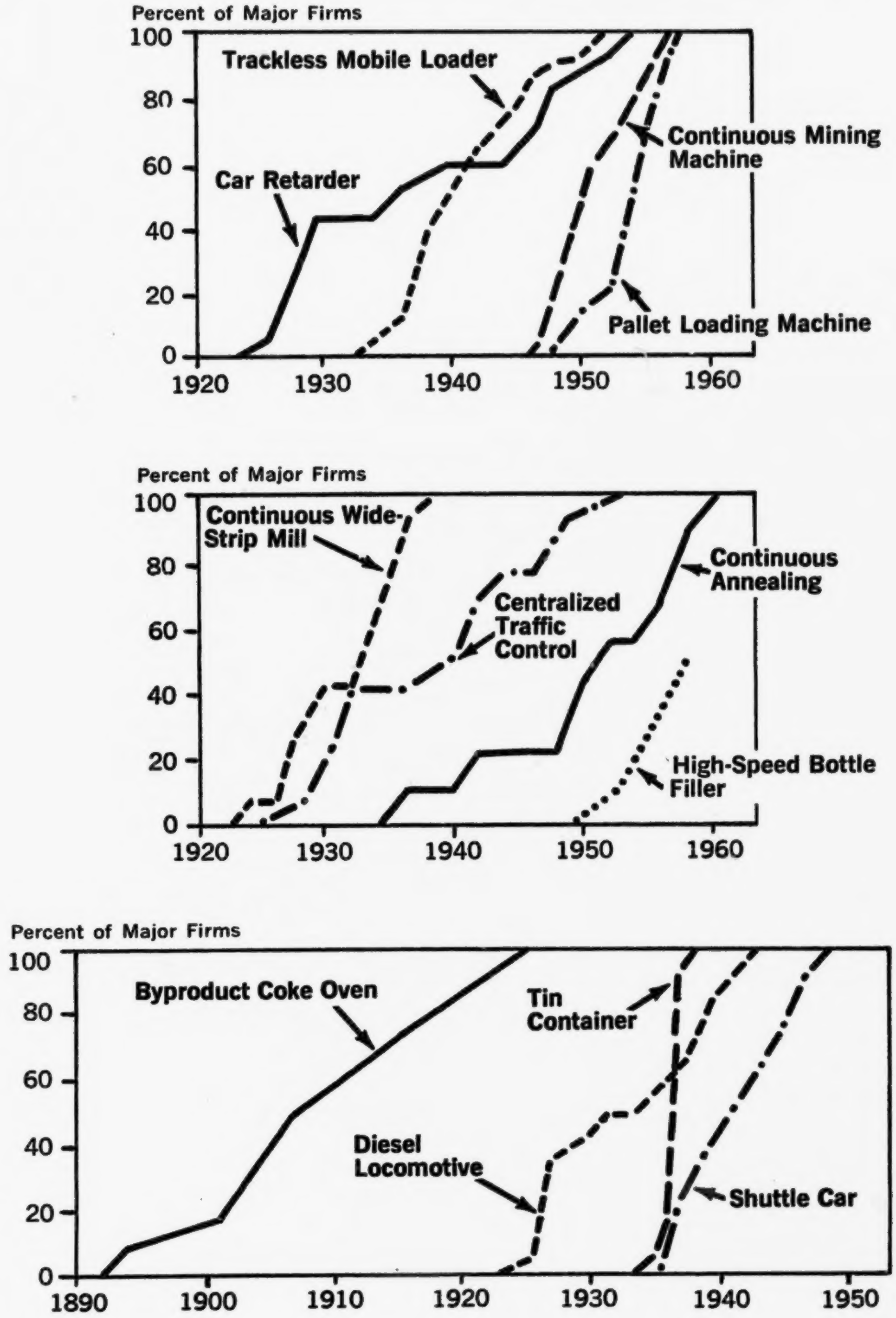
[3] Begins with recognition of commercial potential and the commitment of development funds to reach a reasonably well-defined commercial objective, and ends when the innovation is introduced as a commercial product or process.

Source: Frank Lynn, *An Investigation of the Rate of Development and Diffusion of Technology in Our Modern Industrial Society* (†).

Mansfield's findings were based upon a survey of 12 important technical innovations in 4 major industries. He found only a slight and unclear tendency for innovations to spread more rapidly than in the past, but his estimates of the amount of time involved are not very different from Lynn's. Mansfield calculates the average time lag between invention and innovation in his sample at about 14 years, with another 1 to 15 years before one-half the firms in an industry had imitated the innovation. The diffusion rate of each innovation studied is shown in figure 2.

No small number of case studies can be conclusive; but there is certainly evidence of a faster rate of technological development. The process, however, is still a fairly long one. Our studies suggest that major technological discoveries may wait as long as 14 years before they reach commercial application even on a small scale, and perhaps another 5 years before their impact on the economy becomes large. It seems safe to conclude that most major technological discoveries which will have a significant economic impact within the next decade are already at least in a readily identifiable stage of commercial development.

Figure 2. **RATE OF DIFFUSION OF SELECTED TECHNOLOGICAL INNOVATIONS**[1]
Percent of Firms Adopting Innovation, 1890–1958



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[1] Earliest date shown for each innovation is the year in which a firm first introduced the innovation, regardless of the scale on which it did so.

Source: Edwin Mansfield, "Diffusion of Technological Change," *Reviews of Data on Research and Development*, National Science Foundation, October 1961.

We find, in summary, evidence of enough increase in the pace of technological and economic change that there is no ground for complacency. Our society has not met the challenge of technical progress with complete success. There is much to be done.

General comment on report by Mr. Beirne, Mr. Hayes, and Mr. Reuther. joined by Mrs. Hoffman and Mr. Young:

We have concurred in this report because we believe that on the whole both its analysis and its recommendations are sound—although some of the recommendations could be more forcefully stated and we would have liked to have certain additional recommendations included.

We feel obligated to state regretfully, however, that in our opinion the report lacks the tone of urgency which we believe its subject matter requires and which its recommendations reflect.

The more than 50 percent increase in the trend rate of productivity advance in the post-World War II period compared to the prewar period, and a similar increase in the rate of labor force growth in the years ahead as compared to the 1950's, give new dimensions to the two major challenges that face us. The first is to provide productive employment and adequate incomes for all who are willing and able to work so that all may participate in the creation and sharing of the abundance that our developing technology makes possible. The second is to carry out programs and policies in both the private and public sectors to insure the fullest utilization of our productive potential to make life for all our people far better than most would have dared to dream just a few decades ago.

We agree that the problems flowing from technological change during the next decade will not be unsolvable economically. The obstacles to their solution are essentially political. The fundamental political problem is the lack of a sense of urgency in many quarters in dealing with human problems—meeting individual and social needs and the improvement of the quality of life in our society—comparable to the sense of urgency that moves our Nation to swift, determined, and vigorous action when we face a military challenge.

It is our profound conviction that no person or family should suffer hardship that it is possible for us as a nation to avoid. American Negroes, who have already waited 300 years, must not be made to wait any longer for the full equality that can be theirs only under full employment. Conscience and compassion should be no less compelling and courage should be as great in our pursuit of the rewarding purposes of peace as in our military efforts.

It is, therefore, our hope that this report will be read and understood as an agenda for action—a call for the full mobilization of America's resources in the building of a truly Great Society.

General comment on report by Mr. Sporn, joined by Mr. Haggerty:

Perhaps it is inevitable in the nature of the assignment given this Commission that the major emphasis of this report should be on the problems associated with technological change and their possible solutions. However, I believe that this report fails to give adequate emphasis to the positive contributions of technology. Technological progress in the United States has played a major role in bringing this Nation the highest standards of material welfare more broadly disseminated throughout its population than has ever before been achieved by any society in the history of the world.

Automation represents a logical extension of this 200-year-long history of technological progress that carries the potential for continuing to enhance the productive capabilities of our society and to make possible the continuing expansion of the material, social, and spiritual welfare of the Nation and of the world. It does not represent a radical departure from past experience, but its continued development is essential to expand the capabilities of our society and to disseminate more widely rising levels of human well-being.

The material and spiritual wealth made possible in large part by technological progress has raised our standards of expectations and performance so that our society is no longer willing to accept the inevitability of the hardships of dislocations that often accompany the change characteristic of a dynamic society. However, this cannot stand as an indictment of technology, but only as a challenge to the dynamism, strength, and adaptability of the Nation's political, social, and economic institutions to develop and facilitate the widespread introduction of new technology and the wider dissemination of its benefits. In this context it is imperative that our society, while continuing to pursue vigorously a course of uninterrupted technological advance, undertake without delay vigorous programs to relieve individuals of the adverse impacts of the dislocations stemming from advancing technology. Thus resistance to change can be reduced and further technological progress promoted.

TECHNOLOGICAL CHANGE AND UNEMPLOYMENT

The language and legislative history of Public Law 88–444 leave no doubt that Congress was seriously concerned with the role of technological change and the high levels of unemployment which persisted in the United States after 1953. At the end of the Korean war, unemployment began to creep upward from an average level of some 3 percent of the civilian labor force; it rose and fell with economic conditions, but stalled at higher levels at the peak of each succeeding business cycle. The explanation was sought by some in the dramatic technological changes that had occurred during the 1950's. It was not the first time that the possibility of persistent technological unemployment had been the focus of public discussion.

We believe that the general level of unemployment must be distinguished from the displacement of particular workers at particular times and places, if the relation between technological change and unemployment is to be clearly understood. The persistence of a high general level of unemployment in the years following the Korean war was not the result of accelerated technological progress. Its cause was interaction between rising productivity, labor force growth, and an inadequate growth of aggregate demand. This is firmly supported by the response of the economy to the expansionary fiscal policy of the past 5 years. Technological change on the other hand, has been a major factor in the displacement and temporary unemployment of particular workers. Thus technological change (along with other forms of economic change) is an important determinant of the precise places, industries, and people affected by unemployment. But the general level of demand for goods and services is by far the most important factor determining how many are affected, how long they stay unemployed, and how hard it is for new entrants to the labor market to find jobs. The basic fact is that technology eliminates jobs, not work. It is the continuous obligation of economic policy to match increases in productive potential with increases in purchasing power and demand. Otherwise the potential created by technical progress runs to waste in idle capacity, unemployment, and deprivation.

A. General Levels of Unemployment

Changes in the volume of unemployment are governed by three fundamental forces: the growth of the labor force, the increase in output per man-hour, and the growth of total demand for goods and services. Changes in the average hours of work enter in exactly parallel fashion but have been quantitatively less significant. As productivity rises, less labor is required per dollar of national product, or more goods and services can be produced with the same number of man-hours. If output does not grow, employment will certainly fall; if production increases more rapidly than productivity (less any decline in average hours worked), employment must rise. But the labor force grows, too. Unless gross national product (total final expenditure for goods and services corrected for price changes) rises more rapidly than the *sum* of productivity increase and labor force growth (again modified for any change in hours of work), the increase in employment will be inadequate to absorb the growth in the labor force. Inevitably the unemployment rate will increase. Only when total production expands faster than the rate of labor force growth *plus* the rate of productivity increase and *minus* the rate at which average annual hours falls does the unemployment rate fall. Figure 3 shows the year-to-year increases in GNP which were required during the 1950–65 period to maintain the previous year's volume of unemployment, and compares those with the actual GNP in these years. Figure 4 shows that increases in productivity were more important than growth of the labor force as sources of the wide gains in output experienced since 1947. These increases in potential production simply were not matched by increases in demand adequate to maintain steady full employment.

In the late 1950's, productivity and the labor force were increasing more rapidly than usual, while the growth of output was slower than usual. This accounts for the persistence of high unemployment rates.

The year-to-year movements of the factors which determine the volume of unemployment are shown for the postwar period in figure 5. In this period output per man-hour in the private economy rose at a trend rate of 3.2 percent a year (see figure 6). (For purely statistical reasons the figure is lowered to 2.8 percent when Government employees are included in any calculation of the rate of growth of output required to reduce unemployment.) The labor force had been growing only at about 1 percent a year from 1947 to 1953, a reflection of the low birth rates of the 1930's; between 1953 and 1960 it speeded up to 1.5 percent. Average hours worked per year have been declining slowly and sporadically for a long time, with the average yearly decrease about 0.3 to 0.4 percent (see table 2). The growth rate of output, which had been as high as 5.2 percent a year between 1947 and 1953, slowed to 2.4 percent between 1953 and 1960 (see figure 7). An increase in unemployment was the immediate result. Yet, an addition to the GNP growth rate of only 0.4 percent a year would have prevented unemployment from rising.[1] Since the end of 1960, the growth rate has averaged slightly more than 4.5 percent a year, enough to reduce the unemployment rate from 5.6 to 4.1 percent at the end of 1965.

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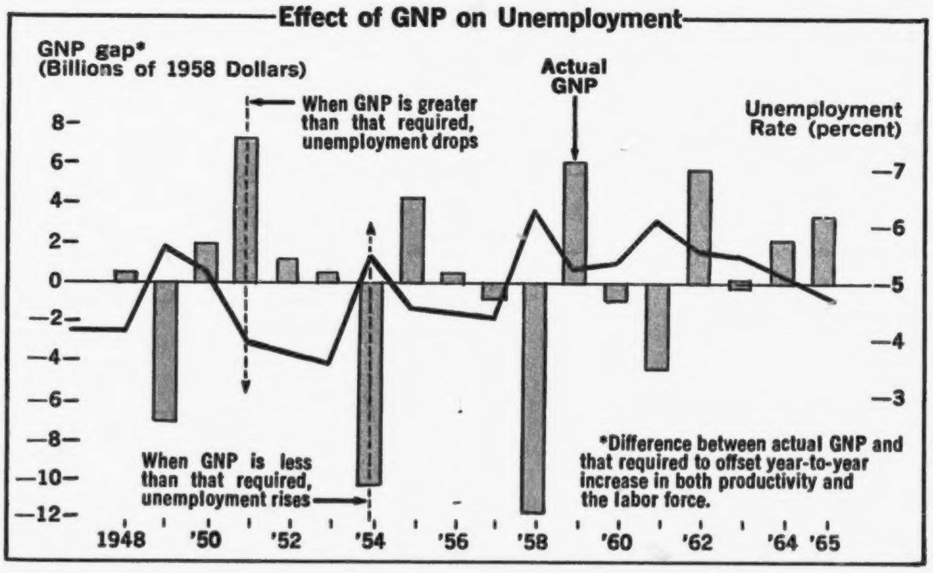
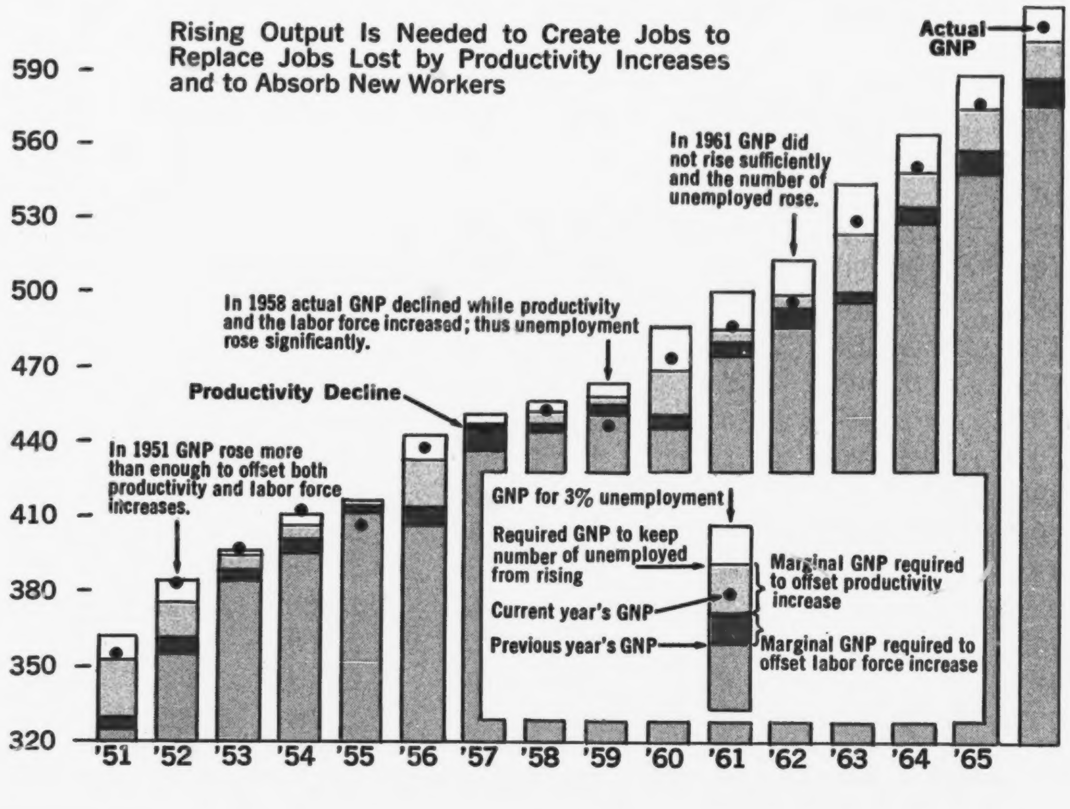
[1] Assuming a rate of productivity increase no higher than that actually recorded.

Figure 3. **GROSS NATIONAL PRODUCT [1] REQUIRED TO OFFSET MARGINAL INCREASES IN BOTH PRODUCTIVITY [2] AND THE LABOR FORCE**

Compared with Actual GNP and with GNP for 3 Percent Unemployment [3]





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[1] The gross national product figures shown are based on actual productivity levels.

[2] Productivity refers here to output (measured by GNP) per employee (total U.S. employment) and does not take into account changes in hours worked.

[3] The use of 3 percent unemployment is illustrative and in no way indicates that the Commission considers it an acceptable level of unemployment.

Table 2.—**Average annual hours worked—farm, nonfarm, and total civilian, 1909–64** [1]

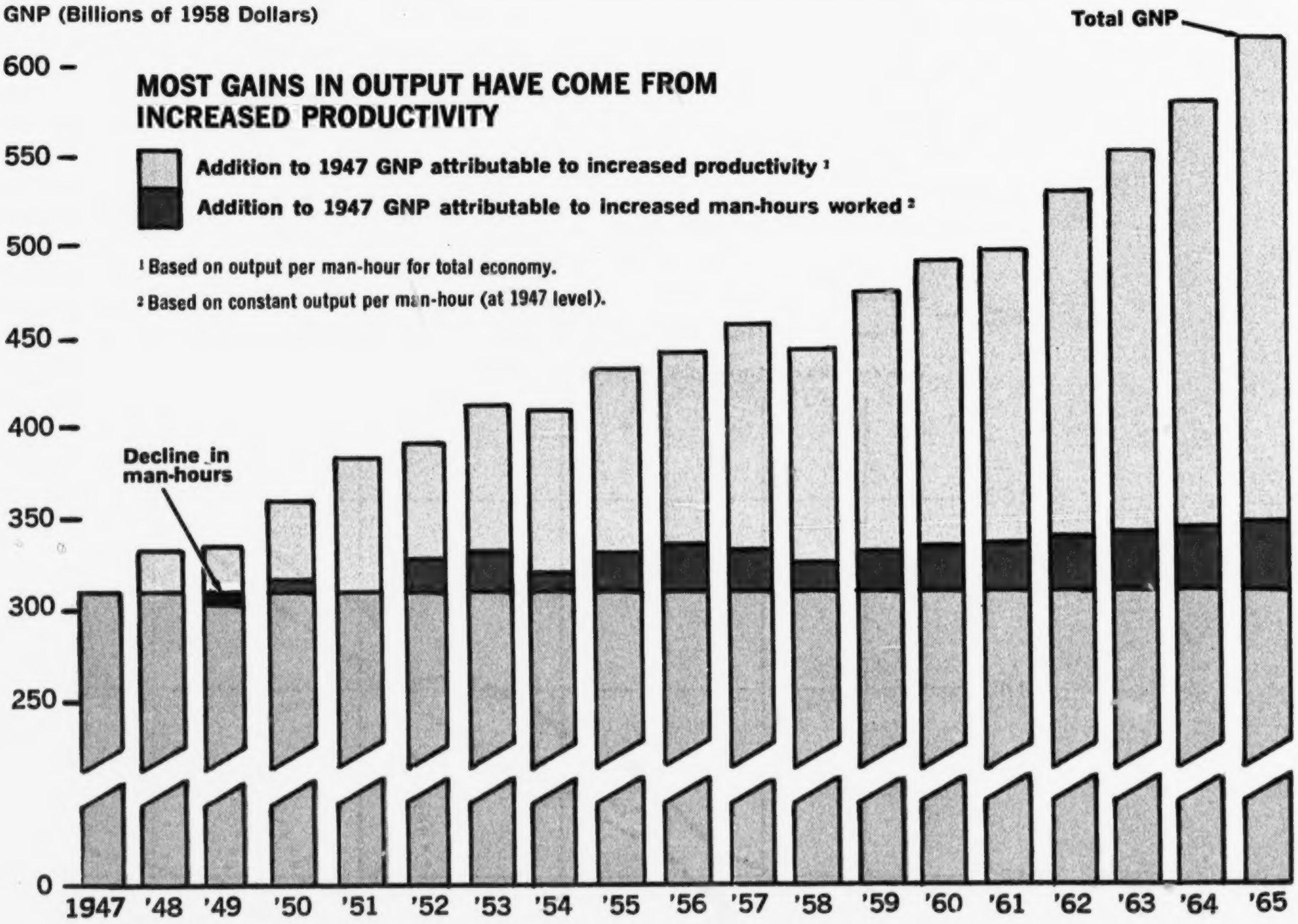
Average annual hours worked by labor force [2]				Average annual hours worked by labor force [2]			
Year	Total civilian	Farm	Private nonfarm	Year	Total civilian	Farm	Private nonfarm
1909...	2, 662	2, 496	2, 763	1937...	2, 276	2, 769	2, 170
1910...	2, 664	2, 497	2, 761	1938...	2, 205	2, 626	2, 107
1911...	2, 674	2, 552	2, 751	1939...	2, 239	2, 738	2, 135
1912...	2, 681	2, 582	2, 745	1940...	2, 246	2, 840	2, 139
1913...	2, 663	2, 547	2, 731	1941...	2, 270	2, 821	2, 172
1914...	2, 647	2, 623	2, 767	1942...	2, 326	2, 980	2, 214
1915...	2, 614	2, 567	2, 658	1943...	2, 384	2, 972	2, 284
1916...	2, 627	2, 544	2, 678	1944...	2, 403	3, 009	2, 301
1917...	2, 634	2, 628	2, 658	1945...	2, 336	2, 868	2, 246
1918...	2, 611	2, 699	2, 603	1946...	2, 223	2, 686	2, 144
1919...	2, 525	2, 679	2, 497	1947...	2, 175	2, 544	2, 112
1920...	2, 547	2, 682	2, 523	1948...	2, 155	2, 527	2, 095
1921...	2, 426	2, 480	2, 429	1949...	2, 131	2, 505	2, 070
1922...	2, 470	2, 578	2, 455	1950...	2, 114	2, 459	2, 062
1923...	2, 507	2, 630	2, 463	1951...	2, 123	2, 489	2, 072
1924...	2, 490	2, 687	2, 523	1952...	2, 114	2, 464	2, 068
1925...	2, 510	2, 741	2, 460	1953...	2, 108	2, 494	2, 062
1926...	2, 524	2, 762	2, 472	1954...	2, 069	2, 446	2, 024
1927...	2, 508	2, 725	2, 463	1955...	2, 082	2, 413	2, 043
1928...	2, 507	2, 763	2, 451	1956...	2, 065	2, 363	2, 032
1929...	2, 490	2, 724	2, 439	1957..	2, 037	2, 295	2, 010
1930...	2, 440	2, 753	2, 370	1958...	2, 013	2, 271	1, 988
1931...	2, 399	2, 759	2, 311	1959...	2, 020	2, 275	1, 996
1932...	2, 317	2, 648	2, 231	1960...	2, 016	2, 288	1, 991
1933...	2, 301	2, 658	2, 208	1961...	2, 006	2, 243	1, 985
1934...	2, 134	2, 405	2, 070	1962...	2, 009	2, 280	1, 987
1935...	2, 177	2, 482	2, 105	1963...	2, 001	2, 258	1, 982
1936...	2, 235	2, 488	2, 181	1964...	1, 999	2, 262	1, 979

[1] Data for 1909–46 is estimated.

[2] In addition to fluctuations reflecting changing levels of unemployment and involuntary part-time work, part of the decline since 1909 in average annual hours worked is attributable to the growing proportion of workers engaged voluntarily in part-time work.

Source: 1947–64 data from U.S. Bureau of Labor Statistics; 1909–46 data calculated on the basis of data in John W. Kendrick, *Productivity Trends in the United States*, 1961.

Figure 4. **SOURCE OF GROSS NATIONAL PRODUCT INCREASES, 1947–65**



Except for the recession years of 1949, 1954, and 1958, the rate of economic growth throughout this period exceeded the rate of productivity increase and employment rose. But in only 6 of the past 12 years was the growth rate high enough to offset both productivity increase and labor force growth. In the other 6 years unemployment rose. (See figures 3 and 5.)

But if part of the national purpose is to reduce and contain unemployment, arithmetic is not enough. We must know which of the basic factors we can control and which we wish to control. Unemployment would have risen more slowly or fallen more rapidly if (1) productivity had increased more slowly, or (2) the labor force had increased more slowly, or (3) hours of work had fallen more steeply, or (4) total output had grown more rapidly. These are not independent factors, however, and a change in any of them might have caused changes in others.

A society can choose to reduce the growth of productivity, and it can probably find ways to frustrate its own creativity. We believe this choice to be utterly self-defeating in its impact on living standards and wages. Although a reduction in the growth of productivity at the expense of potential output might result in higher employment in the short run, the long-run effect on employment would be un-

Figure 5. **INDEXES OF GROSS NATIONAL PRODUCT, LABOR FORCE, PRODUCTIVITY, ANNUAL HOURS (WORKED), AND UNEMPLOYMENT RATE, 1947–65**

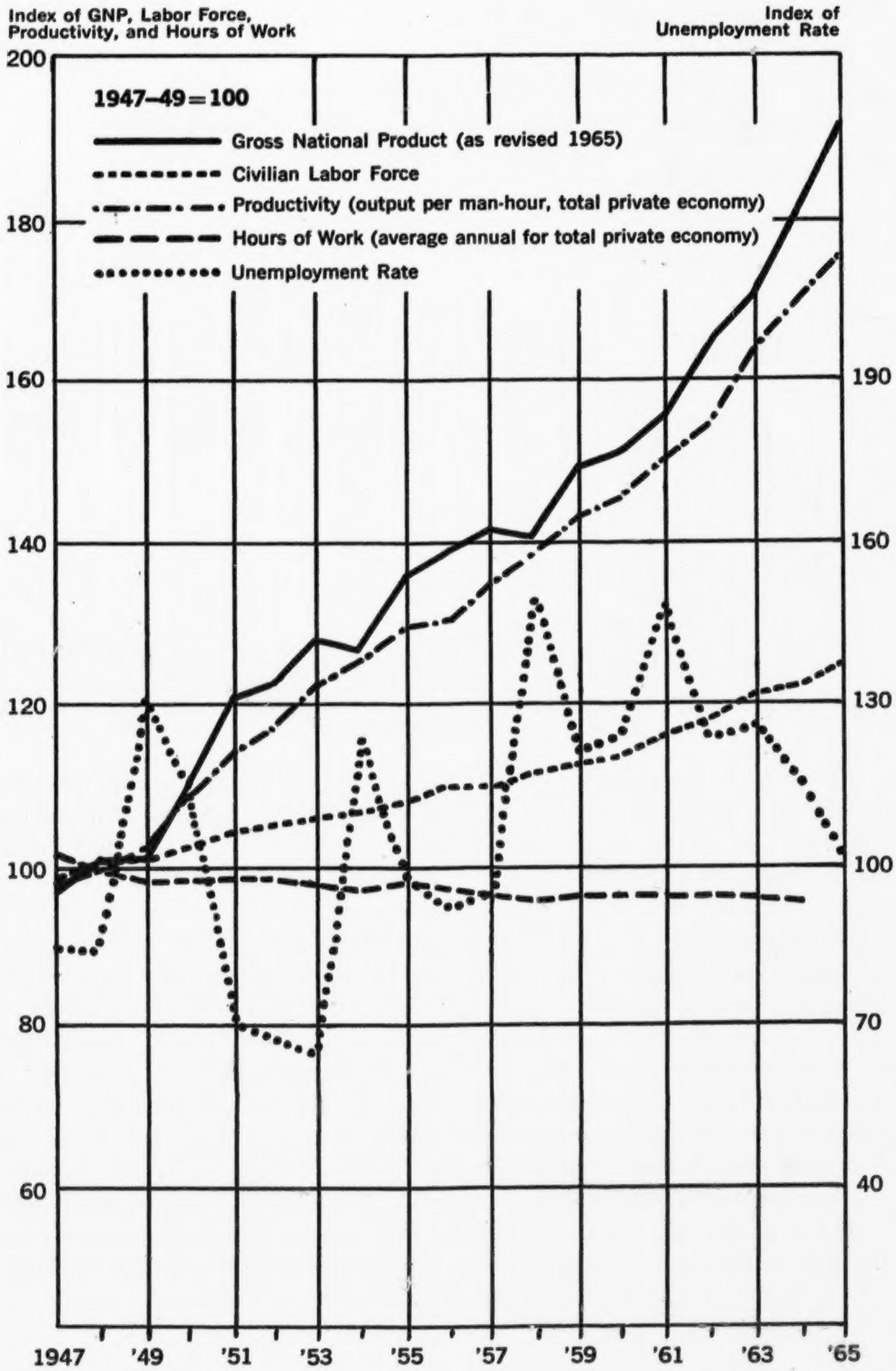
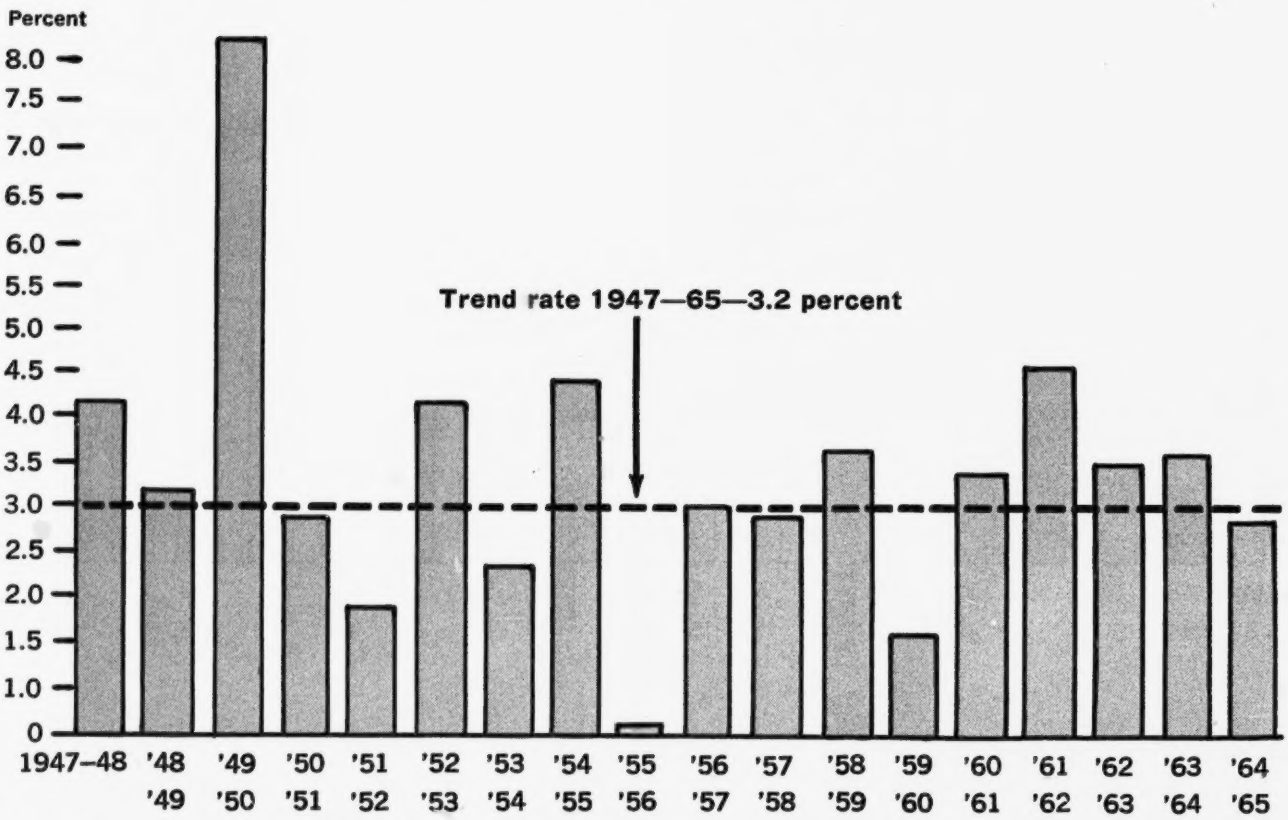


Figure 6. **ANNUAL RATE OF CHANGE OF OUTPUT PER MAN-HOUR [1], 1947–65**



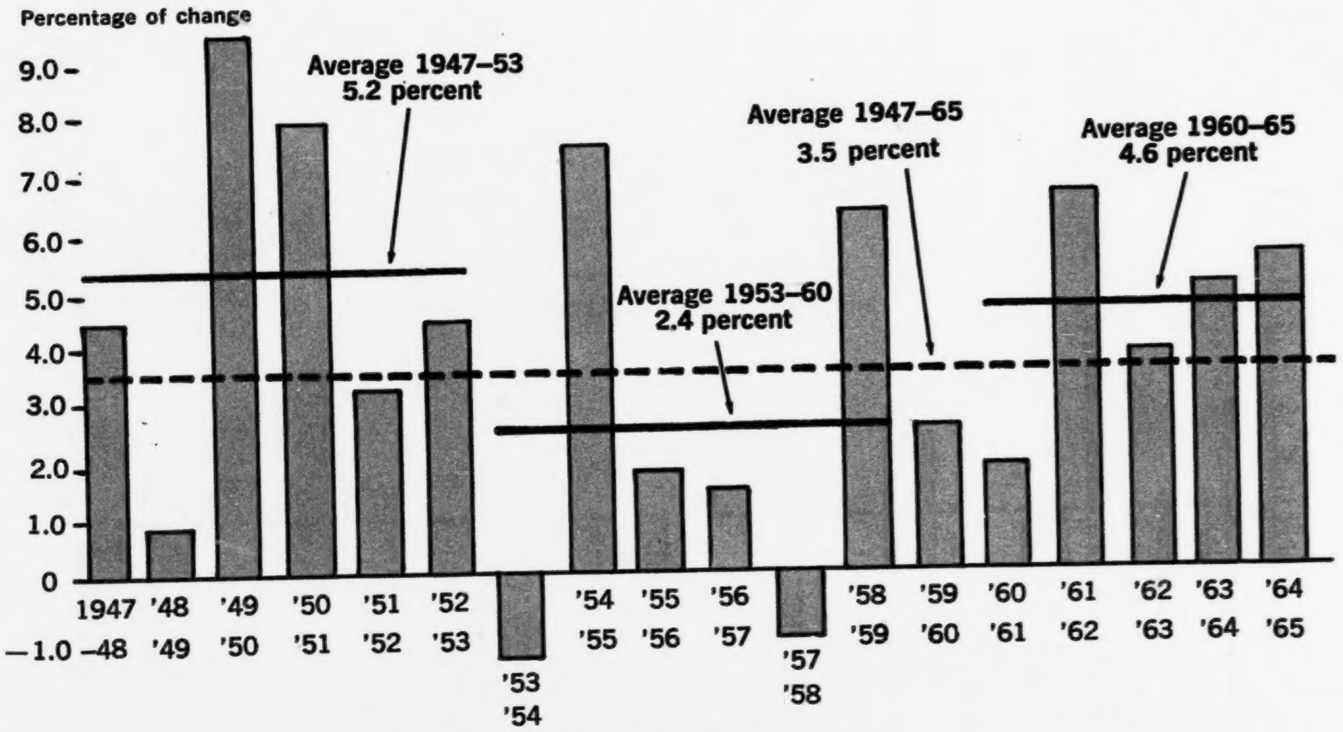
[1] Based on total private economy.

certain and the long-run effect on the national interest would be disastrous. It may be possible to slow the growth of the labor force by encouraging later entry, earlier retirement, lower participation by some groups, or reduced hours of work. In the past, rising productivity has been realized partly through higher incomes and partly through reduced working time and shorter working life. This pattern is likely to continue.

Despite rapid increases in productivity, economic growth consistent with the 2.9-percent unemployment rate of 1953 or the 4.3-percent rate of 1957 would not have been difficult to achieve or sustain; they would have been considerably less than those actually experienced between 1947 and 1953 or between 1960 and 1965. The high unemployment that led to the formation of this Commission was the consequence of passive public policy, not the inevitable consequence of the pace of technological change.

When Public Law 88–444 was passed, the national unemployment rate was 5.1 percent. As this report is finished it is 4.0 percent. The experience of the economy during the life of this Commission is the best evidence that economic growth can continue to offset the growth of productivity and labor force and reduce unemployment further. We believe that continued reduction in unemployment is a feasible task and a matter of urgency for our society. We recognize

Figure 7. **ANNUAL RATE OF CHANGE IN GROSS NATIONAL PRODUCT,[1] 1947–65**



[1] Revised GNP data, in constant 1958 dollars.

that the task is a challenging one under the circumstances of the coming years.

We do not expect output per man-hour in the whole—private *and* public—economy to rise during the next decade at a rate substantially faster than the 2.8 percent a year characteristic of the postwar period. Some moderate acceleration may take place in the longer run. The growth of the labor force, however, is predictable and dramatic. The labor force will increase approximately 1.9 percent a year during the next 5 years, and almost as fast in the following 10 or 15 years. We expect a continued slow and irregular decline in hours of work. It follows that the output of the economy—and the aggregate demand to buy it—must grow in excess of 4 percent a year just to prevent the unemployment rate from rising, and even faster if the unemployment rate is to fall further, as we believe it should. Yet our economy has seldom, if ever, grown at a rate faster than 3.5 percent for any extended length of time. We have no cause for complacency. Positive fiscal, monetary, and manpower policies will be needed in the future as in the past. The Nation should not be lulled into forgetfulness by a short-run need for increased defense expenditures.

B. Displacement of Workers Through Shifts in Employment Among Industries and Occupations[2]

Hidden beneath national averages is continuous movement into, out of, between, and within labor markets. In 1964, for instance, the average number of persons in the labor force was 74 million, with about 70 million employed and 3.9 million unemployed. But that is only part of the story, for in the same year:

- 87 million people were in the work force at some time,
- 85 million different people held jobs,
- 43 million entered or reentered the labor force,
- 42 million left the labor force permanently or temporarily,
- 1.7 million looked for work but did not work at all,
- 14.1 million different people experienced some unemployment,
- 8 million or more changed jobs voluntarily or involuntarily.

The unemployment rate by State ranged from 2.9 to 7.9 percent, by broad occupations from 0.5 to 10.6 percent, by broad industry group from 2.3 to 9.9 percent, by age from 2.7 to 17.8 percent, and by race from 4.6 to 9.8 percent. About 1 out of every 15 persons moved his place of residence. None of these figures include the vast amount of constant change in jobs and job content which is always going on within firms.

Some of the 14 million who experienced some unemployment in 1964 were new entrants to the labor force. Others were laid off only temporarily. But between one-third and one-half of those unemployed were permanently or indefinitely severed from their jobs; they were forced to find new employment, remain among the unemployed, or withdraw from the labor force. Thus the average number unemployed during a year understates the actual volume of involuntary displacement that actually occurred.

There are many causes of displacement. The demand for a product may decline, perhaps in a general cyclical downturn, perhaps because consumer tastes change. A new product or a newly invented process may capture a market from an existing producer. A company or an industry may change its location, perhaps in search of lower wage rates or raw material sources, or because a technological change in transportation affects the relative advantages of being near raw materials sources or near markets. An employer may find himself in an unfavorable competitive position because of technological backwardness, his own inefficiency, or for reasons beyond his control. A major technological development may displace an entire occupational group within a plant. An accretion of small changes may increase productivity more rapidly than output rises and attrition can absorb.

Displacement is implicit in the natural history of economic development, as the example of the United States shows. In the most primitive stages of growth, the labor force is concentrated on producing food and fibers; as the economy becomes more productive, there is a shift to the production of manufactured goods; then,

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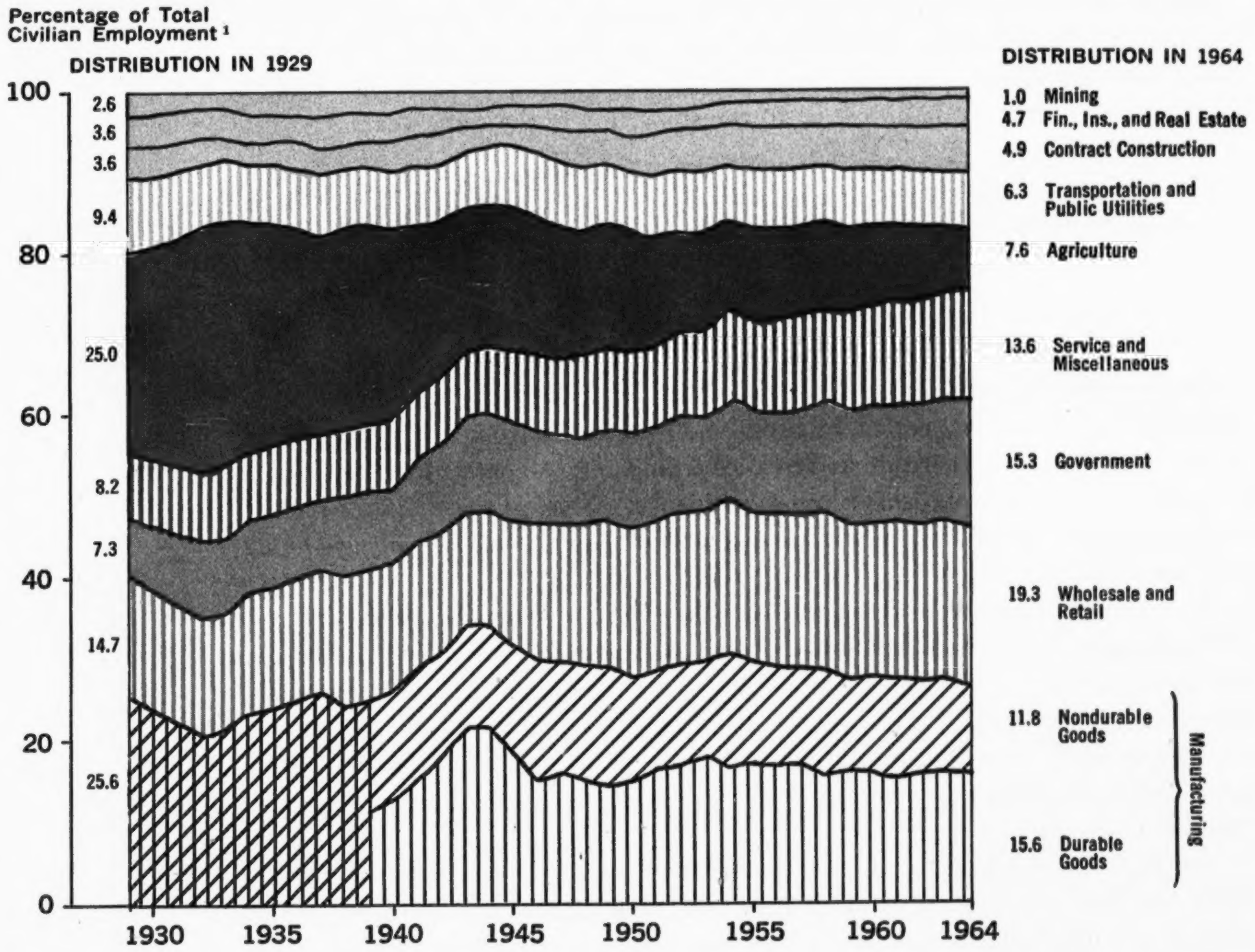
[2] In relation to this section, see Bureau of Labor Statistics, *Disemployment of Labor at the Establishment Level* (†); William Haller, Jr., *Technological Change in Primary Steelmaking in the U.S., 1947-65* (†); Walter R. Butcher, *Productivity, Technology, and Employment in U.S. Agriculture* (†); and Joseph P. Newhouse, *Technological Change in Banking* (†).

Figure 8. **DISTRIBUTION OF EMPLOYMENT BY MAJOR INDUSTRIAL SECTOR, 1929–64**

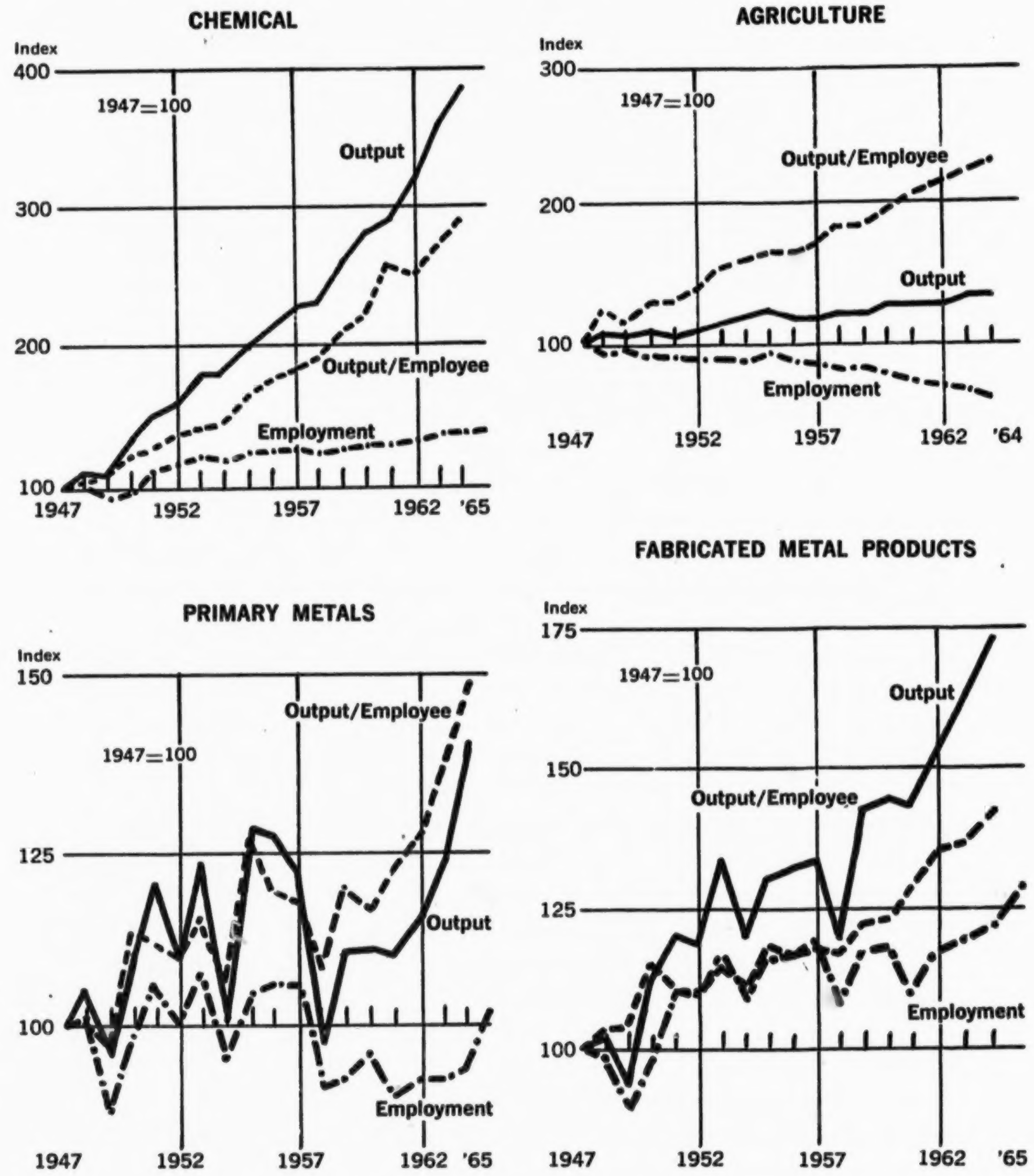


[1] Excludes private household, self-employed, and unpaid family workers.

as basic physical needs are satisfied, larger portions of the labor force are transferred (or displaced) to the production of a variety of services. Figure 8 shows how the distribution of employment by major industrial sector has changed in this country in the course of the last 35 years. There were broad shifts among the major sectors, and within these, large-scale displacement occurred in some industries and rapid employment growth in others. It is as true for an industry as it is for the economy as a whole that employment grows if sales and production rise faster than productivity. If they do not, employment falls. The relationship between these factors for several representative industries during the postwar period is shown in figure 9.

Industry-by-industry accounts of postwar developments in output, productivity, and employment must be interpreted in the context of national totals. An industry whose productivity kept pace with the average for the whole private economy would have experienced an 81.2-percent increase in productivity between 1947

Figure 9. **RELATIONSHIP BETWEEN EMPLOYMENT, OUTPUT, AND PRODUCTIVITY IN SELECTED INDUSTRIES, 1947–65**



CHEMICAL

AGRICULTURE

FABRICATED METAL PRODUCTS

PRIMARY METALS

Source: U.S. Department of Labor and Federal Reserve System.

and 1965. Even in an industry with an average productivity increase, therefore, employment would have fallen if production had not been growing, or had grown only slowly. On the other hand, industries whose production had grown rapidly, even if productivity growth had also been fast, would have increased their employment. Since 1947, employment in the total economy has risen by 21.7 percent. Most industries, therefore, have registered substantial increases in employment.

Technological change has also been a major source of occupational displacement, though not the only one. Innovation can destroy an occupation, create an entirely new one, or transform radically the content of what appears on paper to be the same occupation. In some cases, the change is clearly associated with technological developments: among the losers were farmers and farm workers, coal miners, lumbermen, and railroad employees; among the gainers were office machine workers and electronic technicians. In other cases, the main cause of change was not technological, for example, elementary school teachers, stock and bond salesmen, taxicab drivers and chauffeurs, porters, bartenders, milliners, and athletes.

Employment shifts, whether by industry or occupation or by establishment, are only an indication, not a measure, of the displacement of individuals. Employment changes within an establishment may not enter the statistics at all. Jobs may disappear but the workers may be absorbed in other parts of the establishment. Employment in one firm may decline but be offset by increases in another, leaving industry totals unaffected. There are, however, offsetting forces. Some workers quit voluntarily, retire, or die. A fall in employment which does not exceed this attrition rate need not result in displacement. On the other hand, some of the voluntary quits may be in anticipation of layoffs and therefore represent a hidden displacement.

Nor is there a good measure of the distress caused by displacement. Everything depends on the difficulty with which a new job is obtained, its location, and relative attractiveness. If the economic environment is favorable and the displaced worker has attractive skills, the distress need not be great. If the contrary, the human costs of displacement may be high. Under the best of circumstances a loss of accumulated job rights and a lower wage are likely consequences. The most serious adjustment problems have resulted when massive displacement has occurred among workers with overspecialized skills in isolated areas without alternative sources of employment. Coal miners are a prime example. The most profound of all displacements has been that in agriculture, where, in the postwar period, a 5.7-percent annual rate of productivity increase accompanied by only a 1.4-percent increase in farm output has reduced farmowners and farmworkers from 8.2 million in 1947 to 4.8 million in 1964, or 42.3 percent. Those who left by the door marked "education" entered a new productive life. Too many, suffering from deficient rural educations, lacking skills in demand in urban areas, unaccustomed to urban ways, and often burdened by racial discrimination, exchanged rural poverty for an urban ghetto. How many of the 4.8 million workers who remain in agriculture are underemployed is conjectural, but the number is probably high.

C. Influence of Skill and Education on Unemployment[3]

Occupational changes in the period of rapid productivity growth since 1947 exhibit a few easily identifiable broad trends. Very highly skilled employment has increased rapidly: Professional and technical workers were 6.6 percent of the total in 1947 and 12.2 percent in 1964; the number of unskilled laborers, by contrast, fell as a percent of the total, but not absolutely. In the same span of years there has been a visible shift from manual to white-collar work: In 1947 manual workers were 41 percent of the total, and white-collar workers 35 percent (the remainder were service workers, farmers, and farm laborers); by 1964, the percentage of all workers in manual occupations had fallen to 36, while white-collar occupations expanded to employ 44 percent of all workers (see figure 10). However, the meaning of this trend in terms of skill is far from clear: Many manual jobs are highly skilled, many clerical and sales jobs are unskilled; the requirements are different, but not easily compared.

Unemployment has been concentrated among those with little education or skill, while employment has been rising most rapidly in those occupations generally considered to be the most skilled and to require the most education. This conjunction raises the question whether technological progress may induce a demand for very skilled and highly educated people in numbers our society cannot yet provide, while at the same time leaving stranded many of the unskilled and poorly educated with no future opportunities for employment.

No confident answer can be given to this difficult and complex question. Our society is extending secondary and higher education to larger and larger fractions of the population, and, therefore, it is necessary that the number of suitable and rewarding jobs should increase correspondingly. Otherwise a different kind of frustration would result. We must, then, ask a much more subtle question: Is the demand for highly educated people outrunning the supply, and is the supply of unskilled workers outrunning the demand? It is intrinsically difficult to establish any answer because occupational content can change while the occupational title remains the same, and because it is often unclear which occupations make greater demands in skill and education. Even if we were confident that there were imbalances between skills demanded and skills supplied, it would not follow that the source of the imbalance is technological. Japan and Western Europe operate sophisticated industrial economies with educational profiles far inferior to our own, and there is reason to believe that a highly automated economy could be engineered to fit a variety of educational profiles. But that is not our problem. In the shorter run, whatever the general trend, there is no doubt that technological change may increase, decrease, or simply change the skills required in particular jobs. The result may be displacement.

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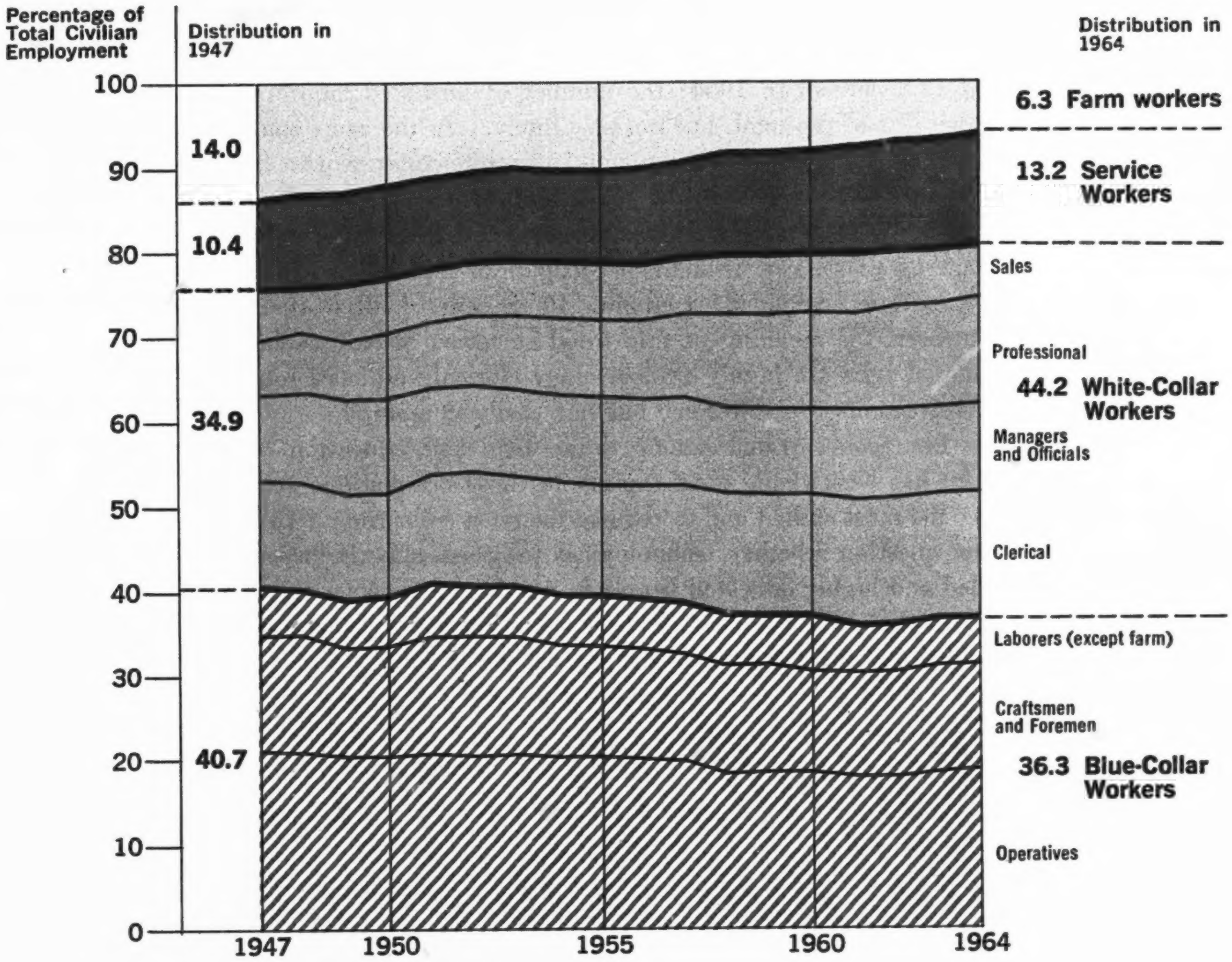
[3] In relation to this section, see James R. Bright, *The Relationship of Increasing Automation to Skill Requirements* (†); and Morris Horowitz and Irwin Herrnstadt, *Changes in the Skill Requirements of Occupations in Selected Industries* (†). See also *Automation: Impact and Implications, Focus on Developments in the Communications Industry*, prepared by the Diebold Group, Inc., for the Communications Workers of America, AFL–CIO, April 1965.

Figure 10. **CHANGE IN DISTRIBUTION OF EMPLOYMENT BY MAJOR OCCUPATION GROUP, 1947–64**



Source: *Manpower Report of the President*, March 1965.

There is little doubt that the occupational structure of the American labor force is changing and will continue to change. Perhaps the main reason for this is the rapid growth of those industries—education, finance, insurance, health, and business services—which employ predominantly white-collar and professional workers. Another reason is the rapid improvement in educational attainment itself. Technological change within industries does not seem to be the major factor, except as regards the declining employment of laborers. Whether changes in the demand for different skills are to a substantial extent placing the new jobs beyond the reach of those losing other jobs can best be assessed by examining the relationship between educational attainment and educational requirements.

Here, too, the evidence is at best fragmentary, but the Commission is impressed with labor market developments during the business expansion following the tax reduction of early 1964. As the general unemployment rate has fallen, the improvement has been greatest for those with the least education. In 1965, the unemployment rate for those with 8 years of schooling or less fell from 7.6 to 5.9 percent; for high school graduates with no further education, from 4.8 to 4.1 percent; and for a college graduate, only from 1.5 to 1.4 percent.

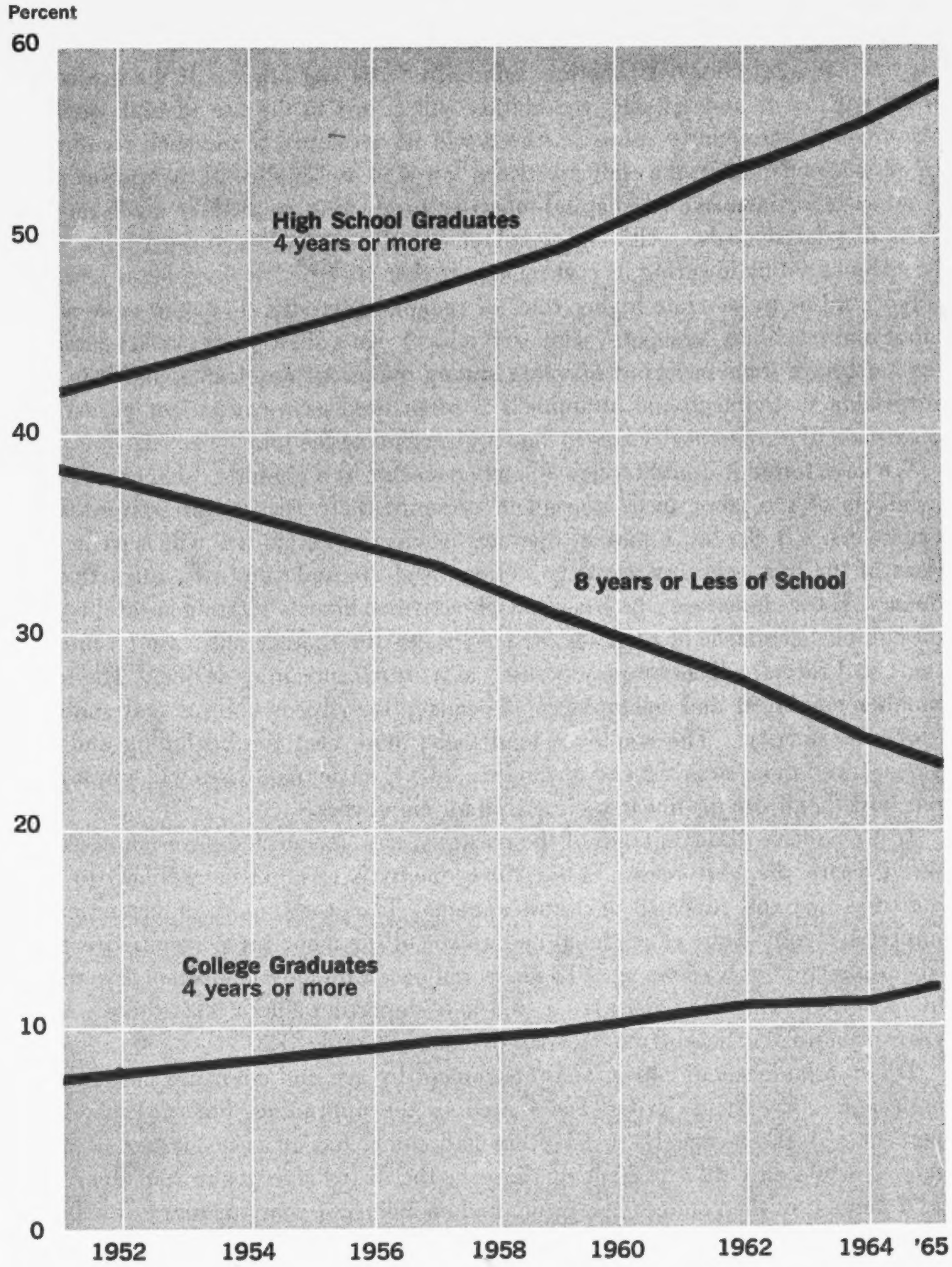
It is the proper function of a market to allocate resources, and in this respect the labor market does not function differently from any other. If the available resources are of high quality, the market will adjust to the use of high quality resources; if the quality is low, methods will be developed to use such resources. In an efficient market, the choice between low-skill and high-skill manpower and between labor-intensive and capital-intensive production methods is made on the basis of relative costs. Although employment of unskilled, untrained labor can be encouraged by lowering its cost relative to that of skilled, trained labor a better way would be to generate higher rates of economic activity. (In the same way, labor and machines "compete" with each other.) In a slack labor market employers must have some means of selecting among numerous applicants, and it is not surprising that educational attainment is often used as a convenient yardstick, regardless of its direct relevance to the requirements of the job.

We have found it useful to view the labor market as a gigantic "shapeup," with members of the labor force queued in order of their relative attractiveness to employers. If the labor market operates efficiently, employers will start at the head of the line, selecting as many as they need of employees most attractive to them. Their choice may be based on objective standards relating to ability, or on dubious standards of race, sex, or age; wage differentials may also be important; and formal education may be used as a rough screening device. The total number employed and unemployed depends primarily on the general state of economic activity. The employed tend to be those near the beginning and the unemployed those near the end of the line. Only as demand rises will employers reach further down the line in their search for employees.

If the relative disadvantages of the unskilled and uneducated have increased in recent years, the main reason is that the economy is less, not more, likely to run out of skilled and educated men and women. Thus the important factor is the impressive gain in the educational attainment of the labor force (see figure 11). The proportion of workers aged 18 years and over who have completed 4 years or more of high school has risen from 43.3 to 57.5 percent since 1952; those with 4 years or more of college, from 8 to 11.6 percent (see table 3).

Differential levels of educational attainment by age and color are particularly noticeable. Every age group has shared in the upgrading, but in 1965, 70.2 percent of workers age 18 to 34 years had completed at least 4 years of high school, while only 46.3 percent of those in the 45–64 age group had done so; 11.7 percent of the younger age group had completed 4 years or more of college, compared with 10.3 percent of the older. The disadvantage associated with color is shocking: Of all nonwhites in the labor force 18 years and older in 1965, 37.6 percent had only elementary school educations, 37.5 percent had completed high school, and only 7 percent had at least 4 years of college. The comparable figures for white workers were 21.6, 60, and 12.2 percent (see table 3).

Figure 11. **EDUCATIONAL ATTAINMENT OF THE CIVILIAN LABOR FORCE,[1] Selected Years, 1952–65**



[1] 18 years old and over.

Source: U.S. Bureau of the Census and U.S. Department of Labor.

Table 3a.—**Years of educational attainment of the civilian labor force 18 years old and over by color, 1952–65**

Color	Elementary 8 years or less	High school 4 years or more	College 4 years or more
White and nonwhite:			
March 1965	23.4	57.5	11.6
March 1962	27.0	53.8	11.0
March 1959	30.5	49.8	9.7
March 1957	33.4	47.3	9.1
October 1952	37.9	43.3	8.0
White:			
March 1965	21.6	60.0	12.2
March 1962	24.7	56.6	11.8
March 1959	27.7	52.6	10.3
March 1957	30.5	50.1	9.8
October 1952	34.9	46.1	8.6
Nonwhite:			
March 1965	37.6	37.5	7.0
March 1962	45.2	31.5	4.8
March 1959	53.8	25.0	4.0
March 1957	57.6	22.7	3.5
October 1952	66.5	17.4	2.6

Source: U.S. Bureau of the Census, *Current Population Reports*, Series P–50, Nos. 49 and 78 for 1952 and 1957 data, respectively; Special Labor Force Reports Nos. 1 and 30 for 1959 and 1962 data, respectively.

Table 3b.—**Median years of school completed by the civilian labor force 18 years old and over by color and age, March 1965**

Color	Age group in years					
	18–24	25–34	35–44	45–54	55–64	65 and over
White	12.5	12.5	12.3	12.1	10.4	9.1
Nonwhite	11.9	11.6	10.2	8.6	7.5	6.3

Source: U.S. Department of Labor, Bureau of Labor Statistics.

The gap between white and Negro educational attainment measures not only the long oppression of the Negro but an economic loss to them and to American society. The problems are especially severe among older Negro workers, but the gap exists at all ages. It must be closed.

It is inevitable in a society where educational standards are improving that the young will be better educated than the old. But the educational disadvantages of Negroes are not inevitable, although they are real and tragic. And because workers of low educational attainment are the least desirable to employers, nonwhite and older workers are concentrated at the rear of the line, not only because of their lower educational attainment, but also because of direct discrimination. Nevertheless, whatever the level of economic activity, whatever the extent of the pressures of demand on employers to seek further down the education and skill ladder, and whatever other hiring standards are used, education and training can improve the ability of people with competitive disadvantages to compete effectively in the labor market.

There is ample justification for increased education and training efforts. Quite aside from the purely personal cultural aspects of education, the level of training and skill affects the overall efficiency of the economy and the flexibility of the labor force, as well as the relative place in line of labor force members. In recent years, economists have produced evidence that the rates of return for investment in education are comparable with those earned on other investments. And cost-benefit analysis of training programs under the Manpower Development and Training Act has shown that the strictly economic returns alone were large enough to pay for the investment.

But a sharp distinction is necessary: The individual's education and skill are important determinants of his relative ability to compete for jobs. The education and skill of the labor force is important to the economy's viability. Technology determines, in part, the skills required and the educational component of those skills. But the availability of skills and the educational level of the labor force are also determinants of the technological changes which occur. Together, education, skill, and technology, along with other factors, determine the structure of employment and unemployment. They do not determine the level of either.

Manpower policy—training, retraining, and education combined—has made progress in recent years. As this report is being prepared, there is yet another urgent reason why such efforts should be increased. Expansionary policy and the demands of the war in Vietnam have combined to push the economy forward and reduce unemployment among nearly all groups in the labor force. The economy has thus come closer to the point where inflationary pressure—in both labor and product markets—becomes a danger. The Commission does not believe that the toleration of unnecessary unemployment is an acceptable way to relieve inflationary pressure. We believe that the tightening of labor markets calls not for relaxation but for an expanded effort to upgrade the unemployed through education and training. Manpower policy is triply productive as it enriches the prospects of the disadvantaged, adds to the productive capacity of the Nation, and helps relieve inflationary pressure.

D. The Impact of Technological Change Upon Employment: The Next 10 Years [4]

In asking us to identify the "new job requirements and the major types of worker displacement, both technological and economic, which are likely to occur during the next 10 years," Congress was reflecting concern that unemployment might continue to creep inexorably upward, that occupations might change and disappear too rapidly for educational institutions and individuals to adjust, and that those without education and skills would be left further and further behind. Our assessment of the past and present effects of technological change have, by implication, already answered some of these questions. If unemployment does creep upward in the future it will be the fault of public policy, not the fault of technological change.

We requested from the Bureau of Labor Statistics a projection of manpower requirements in 1975. The structure of employment a decade ahead can be projected to a first approximation from present trends and foreseen technological developments. The level of employment depends primarily upon public policy, and the Bureau of Labor Statistics has made its projections upon our assumption that neither public opinion nor our public officials will allow a recurrence of slow growth of demand. We also asked experts to project for us the likely progress of some of the more dramatic of the new technologies. All of these projections are contained in the supplementary material to this report. We provide here only a summary.

1. Given the projected growth of the labor force, the assumptions imply that 88.7 million persons would be gainfully employed in 1975, about 18.3 million more than in 1964—an average increase of nearly 1.7 million annually. (This compares with an average annual employment increase of 1.1 million between 1960 and 1965, and 1.8 million between 1964 and 1965.)

2. While it is possible to assume a variety of patterns of economic growth, depending on shifts in investment and consumer expenditure patterns, and changes in emphasis in Government programs, the type of economy projected in this report is one characterized by an extension of the basic patterns which developed in the postwar period. Farm employment is expected to decline by about 1 million and all other employment is expected to increase by more than 19 million, for a net employment gain of 18.3 million. For nonfarm "goods producing" industries—manufacturing, mining, and construction—a moderate increase in manpower requirements [5] of 17 percent is projected, a rate of increase somewhat faster than during the 17-year period 1947–64 (see table 4). Requirements in

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[4] In relation to this section, see Bureau of Labor Statistics, *America's Industrial and Occupational Manpower Requirements, 1964–75* (†); Bureau of Labor Statistics, *Technological Trends in Major American Industries* (†); Eugene Schwartz and Ted Prenting, *Automation in the Fabricating Industry* (†); Thomas Stout, *Manpower Implications of Process Control Computers* (†); Merrill Flood, *Commercial Information Processing Networks—Prospects and Problems in Perspective* (†); Paul Armer, *Computer Aspects of Technological Change, Automation, and Economic Progress* (†); and U.S. Department of Commerce, National Bureau of Standards, *The Role of the Federal Government in Technological Forecasting* (†).

[5] It should be noted that the following discussion of industry employment trends is geared to estimates of wage and salary employment, whereas the overall figures on farm and nonfarm employment cited above relate to total employment, including wage and salary workers, private household workers, the self-employed, and unpaid family workers.

Table 4.—**Employment of nonagricultural wage and salary workers by industry, 1964, and projected requirements, 1975** [1]

Industry	1964	1975	Percent change 1964–75
	In thousands		
Total	58,156	75,875	30
Mining	633	620	(2)
Contract construction	3,056	4,190	37
Manufacturing	17,259	19,740	14
Durable goods	9,813	11,500	17
Ordnance and accessories	247	250	(2)
Lumber and wood products except furniture	603	550	−9
Furniture and fixtures	406	510	26
Stone, clay, and glass products	612	675	10
Primary metal industries	1,231	1,290	5
Fabricated metal products	1,187	1,460	23
Machinery	1,606	2,050	28
Electrical equipment and supplies	1,548	2,000	29
Transportation equipment	1,605	1,730	8
Motor vehicles and equipment	755	800	6
Aircraft and parts	604	575	−5
Instruments and related products	369	510	38
Miscellaneous manufacturing industries	399	475	19
Nondurable goods	7,446	8,240	11
Food and kindred products	1,746	1,665	−5
Tobacco manufactures	89	80	−10
Textile mill products	891	880	(2)
Apparel and related products	1,302	1,525	17
Paper and allied products	625	775	24
Printing, publishing, and allied products	951	1,100	16
Chemical and allied products	877	1,125	28
Petroleum refining and related industries	183	160	−13
Rubber and miscellaneous plastics products	434	580	34
Leather and leather products	348	350	(2)

Table 4.—**Continued**

Industry	1964	1975	Percent change 1964–75
	In thousands		
Transportation and public utilities	3,947	4,425	12
Trade, wholesale and retail	12,132	16,150	33
Finance, insurance, and real estate	2,964	3,725	26
Services and miscellaneous	8,569	12,275	43
Government	9,595	14,750	54
Federal Government	2,348	2,525	8
State and local government	7,248	12,225	69

[1] Projections assume a national unemployment rate of 3 percent in 1975. The choice of 3 percent unemployment as a basis for these projections does not indicate an endorsement or even a willingness to accept that level of unemployment.

[2] Less than 3 percent.

NOTE: Because of rounding, sums of individual items may not equal totals.

SOURCE: U.S. Department of Labor, Bureau of Labor Statistics, *America's Industrial and Occupational Manpower Requirements, 1964–75.*

the "service producing" sector as a whole—trade, finance, government, services, and transportation and public utilities—are expected to increase by 38 percent, somewhat faster than over the past 17-year period, and more rapidly than the goods producing industries.

3. The effect of these industry employment trends will be to continue recent trends in the industrial composition of the economy. Government and services will increase sharply as a percent of the total; contract construction and trade will also increase their share. On the other hand, the relative importance of manufacturing and transportation and public utilities will decline slightly, and the relative size of agriculture and mining will continue to decline sharply. Taking the broad "goods" and "services" sectors as a whole (and including in goods agriculture, with its self-employed as well as its wage and salary workers) the goods sector will decline from about 41 percent of all jobs in 1964 to 36 percent in 1975; the service sector will increase its share of manpower requirements from 59 to 64 percent. (If self-employed persons in nonagricultural industries were added to the above comparison, the services sector would have a slightly larger share in both years.)

4. The occupational requirements of the economy will change substantially as a result of both the differential growth rates of industries and the technological developments and other factors affecting the occupational requirements of each industry. (Table 5 gives the broad outlines.) Concern has been expressed that the impact of technological and industrial change will drastically curtail employment opportunities for less skilled workers. The principal conclusion of the

Table 5.—Employment by major occupation group, 1964, and projected requirements, 1975 [1]

Major occupation group	1964		1975		Percent change 1964–75
	Number (in millions)	Percent	Number (in millions)	Percent	
Total employment...	70.4	100.0	88.7	100.0	26
White-collar workers.......	31.1	44.2	42.8	48.3	38
Professional, technical, and kindred workers....	8.6	12.2	13.2	14.9	54
Managers, officials, and proprietors, except farm..................	7.5	10.6	9.2	10.4	23
Clerical and kindred workers...............	10.7	15.2	14.6	16.5	37
Sales workers............	4.5	6.3	5.8	6.5	30
Blue-collar workers.........	25.5	36.3	29.9	33.7	17
Craftsmen, foremen, and kindred workers........	9.0	12.8	11.4	12.8	27
Operatives and kindred workers...............	12.9	18.4	14.8	16.7	15
Laborers, except farm and mine.............	3.6	5.2	3.7	4.2	([2])
Service workers............	9.3	13.2	12.5	14.1	35
Farmers and farm managers, laborers, and foremen.................	4.4	6.3	3.5	3.9	–21

[1] Projections assume a national unemployment rate of 3 percent in 1975. The choice of 3 percent unemployment as a basis for these projections does not indicate an endorsement or even a willingness to accept that level of unemployment.

[2] Less than 3 percent.

NOTE: Because of rounding, sums of individual items may not equal totals.

Source: U.S. Department of Labor, Bureau of Labor Statistics, *America's Industrial and Occupational Manpower Requirements, 1964–75.*

BLS study, which takes into account the major technological changes in American industry that can be identified and makes a careful appraisal of their potential effects on employment, is that the overall demand for less skilled workers will not decrease over this 11-year period, although it will decline somewhat as a percentage of the total. Needs for laborers (except farm and mine) in 1975 will be roughly the same as in 1964, although they will decrease from 5.2 to 4.2 percent of total manpower requirements. Over 3 million additional service workers will be required, and their share of total jobs will rise from 13.2 to 14.1 percent. Nearly 2 million more operatives will be needed; their share will, however, decline from 18.4 to 16.7 percent. An overall decline of more than 900,000 in the employment of farmworkers is expected, and the share of farm jobs in the total is expected to decline from 6.3 to 3.9 percent.

The greatest increase in employment requirements will be for professional and technical workers; more than 4.5 million additional personnel will be required. The white-collar group as a whole is expected to expand by nearly two-fifths and to constitute 48 percent of all manpower requirements in 1975. The blue-collar occupations are expected to expand at less than half this rate, and will make up about 34 percent of all requirements. A rapid expansion in requirements for service workers is anticipated—a 35-percent increase in employment.

5. These changes in occupational requirements have significant implications for certain groups in the labor force. If nonwhites continue to hold the same proportion of jobs in each occupation as in 1964, the nonwhite unemployment rate in 1975 will be more than five times that for the labor force as a whole. In 1964, the unemployment rate of nonwhites was 9.8 percent, about twice that for whites. If trends in upgrading the jobs of nonwhites continue at the same rate as in recent years, the nonwhite unemployment rate in 1975 would still be about 2½ times that for the labor force as a whole. Thus nonwhites must gain access to the rapidly growing higher skilled and white-collar occupations at a faster rate than in the past 8 years if their unemployment rate is to be brought down to the common level.

If all occupations have the same composition by age in 1975 as in 1964, opportunities for younger workers (aged 14–24) will be substantially fewer than the number in this age group seeking work. The unsatisfactory current relation of youth unemployment to total unemployment will worsen unless utilization patterns change. There is here a clear need for action.

It is at best difficult to separate the technological from other causes of the structural changes we have been describing. To the displaced employee, or even to the maker of public policy, the precise causes of displacement and unemployment may not even seem important. Because society gains from the flexibility and responsiveness which are the sources of displacement, it is society's responsibility to see that alternative opportunities are available and that blameless individuals do not bear excessive costs.

CREATING AN ENVIRONMENT FOR ADJUSTMENT TO CHANGE:

Employment and Income

We have stated the view of the economic role of technological change to which the Commission has come in the course of its deliberations. Our assignment includes also an obligation to make recommendations to management and labor and to all levels of government to "facilitate occupational adjustment and geographical mobility" and to "share the costs and help prevent and alleviate the adverse impact of change on displaced workers." Our recommendations flow logically from the view we have already adopted.

Constant displacement is the price of a dynamic economy. History suggests that it is a price worth paying. But the accompanying burdens and benefits should be distributed fairly, and this has not always been the case. The costs of displacement to employees do not exhaust the total costs of technical and economic change. Business firms, labor unions, schools, government agencies and other institutions, as well as persons, develop some vested interest in the status quo. An economic or technological change that represents progress to society as a whole may, in a nation devoted to political and industrial democracy, be resisted by persons and institutions to whom it appears a threat. Though public policy has less obligation to the perpetuation of institutions than to the protection of individuals, there is a public interest in reducing resistance to progress.

Our analysis of the economic impact of technological change suggests the following organization of our recommendations for facilitating adjustment to change.

1. For those with reasonably attractive skills and no other serious competitive handicaps, ample job opportunities and adequate incomes can be assured by management of the total demand for goods and services.

2. For those less able to compete in the labor market, productive employment opportunities adapted to their abilities should be publicly provided.

3. Under the best of circumstances, there will be some who cannot or should not participate in the job economy. For them, we believe there should be an

adequate system of income maintenance, guaranteeing a floor of income at an acceptable level.

Our recommendations which relate to employment and income are discussed in this chapter. We reserve to the next chapter those recommendations which relate to information and mobility, education and training, and to the regional context of technological displacement.

A. The Management of Total Demand

It is the unanimously held conviction of the Commission that the most important condition for successful adjustment to technological change is an adequate level of total income and employment. We recognize that this is not the end of economic policy, but we are confident it is the beginning. We have noted that the unemployment problem we contemplated when we first met has diminished in the course of 1965. The sequel to the Revenue Act of 1964 has clearly demonstrated that Federal fiscal and monetary policy can bridge the gap between the current level of private spending and the level of total demand needed to reduce unemployment. During the life of the Commission the very groups disproportionately burdened by unemployment—the young and inexperienced, the undereducated, the unskilled, Negroes, production workers—have profited more than proportionately from the healthy growth of total employment. Many of them have benefited from such innovations in manpower policy as the Job Corps or the Neighborhood Youth Corps. This, too, is a source of satisfaction and an incentive to do better.

We believe that the potential for general expansion of demand and employment has not yet been exhausted. We recognize that as labor markets and product markets become tighter and production comes closer to capacity in important industries, the beginnings of inflationary pressures emerge. It is not our business to predict what will occur during the next 12 months either in Asia or in the domestic economy. We urge, however, that the toleration of unnecessary unemployment is a very costly way to police inflation. It deprives the country of valuable output, and it sacrifices the poorest and least privileged among our citizens. It is preferable to press carefully ahead with the expansion of total production and employment, and simultaneously to redouble private and public efforts in the manpower field to relieve shortages in skilled and trained labor as they arise and develop effective means of combatting other causes of inflation.

As we write, events in the economy and elsewhere are moving rapidly; there is considerable uncertainty about the size of the economic and manpower burden of military operations in Vietnam. Under the circumstances, we can make no attempt to suggest the precise direction that fiscal and monetary policy should take in the near future.[1] We urge most strongly, however, that economic policy aim resolutely and watchfully at a reduction in the general unemployment rate to 3.5 percent or below by the beginning of 1967. No good is done our economy

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[1] In relation to this, see George L. Perry, *Employment, Output, and Policy Requirements for Full Employment* (†).

or our country by recoiling from that task prematurely. For the longer run, we believe it to be of the highest importance to the future of democracy in the world that this country never present to its neighbors the spectacle of wartime prosperity yielding to peacetime unemployment.

Some combination of tax reduction (leading to higher private spending) and increased public expenditure will be required to stimulate the economy when stimulus is needed. The choice between them depends upon our national priorities; a balanced policy will in the long run surely include both. We believe that the Nation faces a backlog of public neglect as the aftermath of a sequence of depression, war, and high defense spending. The needs in education, health, transportation, pollution control, resource development, and similar areas in the public domain are obvious to us and, we believe, to the public generally, though we may differ about the precise orders of priority. It is possible that international conflict may temporarily drain into military uses some of the resources that might be devoted to improving the American environment. If not, or when it no longer does so,* it is our considered judgment that major attention should be given to public investment expenditures, some of which we will mention later in this report. No easy short-run conclusion is possible on the basis of the facts available to us. Since the rewards are so great in employment for the disadvantaged, we wish to lend our weight against any easy deflationism. Every bit of employment and output counts.

B. Public Service Employment

We are not impressed with a 4-percent unemployment rate, or a 3-percent, or any other unemployment rate, as an ultimate goal of economic policy. We take seriously the commitment of the Employment Act of 1946 to provide "useful employment opportunities for all those able, willing, and seeking to work." This cannot mean literally zero unemployment since, in a free economy, there will always be some turnover, voluntary and involuntary. Indeed, there is some evidence that the highly mobile American economy generates more voluntary turnover than the other major industrial economies. It does mean limiting unemployment to the minimum amount necessary for the smooth functioning of a free labor market. It would probably mean the disappearance of long-term unemployment for those genuinely in the labor force. We recognize that to expand demand through gross monetary and fiscal policies sufficiently to eliminate all but short-term frictional unemployment would place the price level under heavy pressure. Both those price pressures and the frictional level of unemployment itself can be reduced by appropriate programs of education, training, and labor market improvements. But these too have their limits.

In terms of our image of the labor market as a queue, fiscal and monetary policies begin at the front of the queue and work toward the rear. Education and training and labor market policies affect not only relative places in the line, but the depth to which general economic policies can reach without generating inflation. Yet when all that is done, there remains another possibility: to begin at the rear of the line and create employment opportunities tailored to the abilities of those with serious competitive disadvantages.

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*For comment by several Commission members, see p. 41.

We are impressed with the extent to which recent policy has been designed to do exactly that. The Neighborhood Youth Corps and several other provisions of the Economic Opportunity Act, for example, represent a new departure in U.S. employment policy. New Deal public works programs provided sorely needed employment and created valuable facilities during a period of mass unemployment. The new programs are different; they are aimed specifically at those left behind in an otherwise prosperous economy. They recognize the anomaly of excessive unemployment in a society confronted with a huge backlog of public service needs in its parks, its streets, its slums, its countryside, its school and colleges, its libraries, its hopitals, its rest homes, its public buildings, and throughout the public and nonprofit sectors of the economy. They recognize that employing the unemployed is, in an important sense, almost costless. The unemployed consume; they do not produce. To provide them meaningful jobs increases not only their income but that of society. Much of the work that needs doing calls only for limited skills and minor amounts of training. Some of it is manual in character; some of it is subprofessional.

The principle of such public service employment has been implicitly endorsed in existing programs. We recommend that the concept be expanded and made explicit as a permanent, long-term program. The necessary steps are as follows:

***Table 6*.—Estimates of potential sources of new jobs through public service employment**[1]

Source of employment	Job potential (in millions)
Medical institutions and health services	1.2
Educational institutions	1.1
National beautification	1.3
Welfare and home care	0.7
Public protection	0.35
Urban renewal and sanitation	0.65
Total	5.3

[1] Estimated from various unpublished sources.

1. The major resources must come from the Federal Government but the jobs need not. Table 6 lists some areas of the economy where important social needs are now inadequately met, if indeed they are met at all, and our estimates of the amount of useful employment which could be made available to people with relatively low skills. Many of these jobs are in the State and local sector of the public economy. Were it not for the endemic financial stringency at those levels of government, the employment might already have been provided, though perhaps without effort to allocate the jobs to the rear of the queue. A Federal funding agency could provide program approval and financial administration. State and local governments and certain kinds of nonprofit institutions as well as Federal agencies could submit proposals demonstrating ability to use the available labor productively without reducing existing levels of employment or subverting prevailing labor standards.

2. The sponsoring institutions should treat the new employees as regular employees, integrating them with existing work forces and enforcing regular standards of performance. The wages paid should be in no case lower than the Federal minimum wage, with the possible exception of a partial exemption for youth. The public service employment program should be coupled with basic education, training, and counseling to raise the productivity of the employees and assist them to move on to better jobs. With this assistance, the opportunity for higher incomes would provide the necessary incentive to seek other jobs. Since the jobs would provide services for which society has growing needs, no element of make-work would be involved.

3. All the relevant questions cannot be answered or even foreseen before more experience has accumulated. But one of the proposed program's advantages is its flexibility. It can be readily adapted to unemployment levels, fiscal requirements, and other factors. Indeed we suggest that the operation of the program might be keyed to specific localized unemployment problems by region or by demographic group. The administration, job development, and recruitment cannot occur overnight. The first step is to make explicit the concept already implicit in existing programs by recommitting Federal policy to the Employment Act's promises of a job for "all of those able, willing, and seeking to work." Then the amount of employment provided can be expanded as rapidly as possible, holding open the possibility of delay or contraction if changing circumstances or adverse experience require.

We therefore recommend (1) that public service employment opportunities be provided to those unsuccessful in the competition for existing jobs; (2) that a 5-year program be established, with the amount of public service employment increased each year, depending upon previous experience and labor market conditions; (3) that an initial sum of perhaps $2 billion be appropriated to provide about 500,000 additional full-time public service jobs; and (4) that the program be coupled with a serious attempt to learn more about the nature and causes of "hard-core" unemployment by case and survey methods.

C. Income Maintenance [2]

We are convinced that rising productivity has brought this country to the point at last when all citizens may have a decent standard of living at a cost in resources the economy can easily bear. We believe that nearly all should, and wish to, earn their own support, for the dignity and self-respect that come from earning one's own living can hardly be achieved otherwise. Most of our recommendations are directed to making it possible, or easier, for people to adjust to a fast-changing technological and economic world without major breaks in the continuity of employment. But the problem of income maintenance is broader than the problem of displacement from employment.

The war on poverty has made it abundantly clear that the road to a satisfying life through work is not open to everyone: not to families without breadwinners, not to those whose productivity is reduced by physical or mental incapacity, not to people too old to work. They are not necessarily victims of technological progress. Nevertheless, income maintenance for them must also be considered in this report, not only for the sake of completeness, but also because technological advance is the source of the productive capacity which permits us, as a nation, to tackle the problem. Our concern here is for economic progress, not fear of technological change.

Wage-Related Social Insurance Programs

Most people who spend the greater part of their adult life working can protect themselves against loss of income due to death, disability, old age, or unemployment through social insurance programs. In these programs, benefits are related to wages and are paid as a matter of right; they do not require a means test. During fiscal year 1964–65, social insurance programs paid over $28 billion in benefits to approximately 20 million people. Payments went to the poor and nonpoor alike. No more than half the total went to persons with incomes below the poverty line.

Improvement in our unemployment insurance system could directly facilitate adjustment to change. In his study for the Commission, Stieber reports:

> Unemployed workers receive a higher proportion of former earnings in all countries studied (Great Britain, France, West Germany, Sweden, and the Netherlands), with the possible exception of Great Britain, than in the United States. Insurance payments almost always average more than 50 percent of earnings, and often reach 80 to 90 percent in some countries. This compares with the average of about 35 percent of former earnings in the United States as a whole, though some States pay considerably more.

In June 1965, the Commission publicly took note of the inadequacies in our present system of Federal-State unemployment insurance, unanimously urging in a letter to congressional leaders that:

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[2] In relation to this section, see Sar A. Levitan, *Programs in Aid of the Poor* (†); and Jack Stieber, *Manpower Adjustments to Automation and Technological Change in Western Europe* (†).

> Benefit levels must be increased; benefit periods must be lengthened; coverage must be extended; Federal standards must be provided to assure that workers unemployed by factors incident to a national economy, receive adequate protection regardless of the State of residence; a permanent Federal program for protection of the long-term unemployed must be added. Supplementation of the public system by private agreement must be encouraged by removing restrictions which exist, including regulations in certain States which eliminate or reduce benefits to those receiving supplementary unemployment benefits, severance pay, early retirement, and similar private payments.

Particular attention must be given to the needs of those with long records of steady employment who suddenly find themselves permanent victims of economic or technological change.

Average Old Age and Survivors and Disability Insurance benefits per individual recipient are currently less than $1,000 a year. We find this inadequate; we recommend that benefit standards be lifted.

Benefits under Workmen's Compensation are also in need of reform. Federal legislation is needed to establish minimum standards for Workmen's Compensation. There is also a serious lack of general protection against loss of income due to temporary disabilities arising from nonoccupational accidents or sickness.

Public Assistance.

Public assistance programs as part of an income maintenance system provide minimum income support, usually but not exclusively for families without an earner, on the basis of proved need. Recipients of public assistance do not receive benefits as a matter of right, as in the case of social insurance. They must be able to demonstrate under rigid criteria an absolute need of income for subsistence. Special programs supported by Federal, State, and local governments have been established for the aged, the blind, the totally disabled, and families with dependent children. Although public assistance programs have provided needed support for many—nearly $6 billion was paid during fiscal year 1964–65 to over 9.4 million persons—they leave much to be desired.

In principle, welfare payments are limited by a strict means test to the difference between some minimum standard and a family's resources from earnings. This has the absurd consequence that additional earnings are taxed 100 percent. Unless the family can earn enough to dispense with public assistance entirely, it loses a dollar of welfare payments for every dollar it is able to earn. It would be hard to imagine a system less consistent with our society's high valuation of work and self-help.

The "man in the house" regulation in the program for Aid to Families with Dependent Children has received more attention. In many communities, payments cannot be made to households with an able-bodied adult male in residence. Consequently, fathers are encouraged to desert their destitute families so that they may be eligible for public assistance.

Perhaps the system's most serious faults are the stringency of need tests and the small size of payments. The average payment per recipient (children and adults) under the program of Aid to Families with Dependent Children is $34 a month. Though families may receive public assistance from other sources as well, the system is hardly generous. There is wide variation among the States, with some paying as little as one-quarter of the national average of $34 per month.

Less than one-quarter of the 35 million people now living in poverty receive any type of public assistance payment and less than one-third of the 15 million children living in poverty benefit from public assistance.

It is not for this Commission to make detailed recommendations in the field of income maintenance and social insurance. We feel strongly, however, that a better integrated and more comprehensive system of social insurance and income maintenance is both necessary and feasible at this stage in our history. We recommend that Congress undertake a detailed review of the entire system, including both its coverage and its financing. There is danger, in our view, that reliance on a narrow payroll tax base makes the system more and more regressive as incomes rise and other taxes are reduced.

The Commission recommends also that Congress go beyond a reform of the present structure and examine wholly new approaches to the problem of income maintenance. In particular, we suggest that Congress give serious study to a "minimum income allowance" or "negative income tax" program. Such a program, if found feasible, should be designed to approach by stages the goal of eliminating the need for means test public assistance programs by providing a floor of adequate minimum incomes. A minimum income allowance would complete the symmetry of our tax system, under which tax payments are related to income, family size, medical, and other costs, by acknowledging the continuity beyond zero tax rates. It seems anomalous to us that a family of five now pays the same tax—zero—whether its total income is $500 or $3,500.

Concrete proposals for such an income allowance program have been advanced by Milton Friedman, Robert Lampman, James Tobin, and others. Under any version of the minimum income allowance, persons with incomes below an acceptable standard would receive a tax rebate or cash allowance, just as persons with incomes above exemption levels pay taxes. Some proposals would cost as little as $2 billion per year while others would cost over $20 billion per year, depending on the level of income floor established and the care that is taken to see that no payments go to those with incomes above the "poverty line." All schemes share the feature that payments by the Federal Treasury are based on declarations of present or past income. Federal income tax returns could be used as a basis for determining qualification. Income statements could be filed quarterly, semiannually, or annually, and payments could be made monthly.

Income maintenance payments under any such scheme should be designed to eliminate the gap between reported income and an explicit minimum. Most other systems result in some payments to those not poor. The incentive to work can be preserved by a schedule reducing the allowance partially for an increase in earned income.

Estimates relating a tax allowance schedule to total budgetary costs are based on complex assumptions which cannot be explored here. Some proposals relate the tax allowance schedule to unused exemptions and deductions, while others relate payments to the poverty-income gap. It has been estimated that it would cost $2 billion annually to pay nontaxable families an allowance equal to 14 percent (the lowest bracket rate in the present income tax law) of their unused exemptions and deductions. The net cost of eliminating 50 percent of the poverty-income gap is estimated to be between $5 and $8 billion per year.

There are many problems so far unresolved in connection with any system of income allowances or negative income taxation. It will be necessary to decide what forms of personal income are to be counted as reducing eligibility, and how the system is to be integrated with existing categories of social insurance and public assistance. For example, Congress might decide that beneficiaries under Old Age Survivors and Disability Insurance should not be eligible for income allowances; but in that case Congress should see to it that minimum OASDI benefits do not fall short of the income guarantee promised by the allowances. Some government transfer payments, like veterans' pensions and unemployment compensation, are intended to be compensation earned by past services or past contributions. Recipients of such payments should therefore presumably be eligible for income allowances, but the amount of those payments would presumably count as income in determining eligibility. Some forms of public assistance, on the other hand, would be replaced by a system of income allowances. Congress could ignore public assistance payments entirely, letting State and local governments decide at what level they will supplement the allowances under the negative tax program. Although this approach would permit continued inequality among States, the income allowance would provide a floor now lacking.* By relieving the States of part of the burden of public assistance, the minimum income allowance would stabilize or even reduce a source of rapidly rising demand on their limited fiscal resources. If adopted, it would seem appropriate to introduce an income maintenance program in stages, as it becomes necessary to counter the fiscal drag in the present tax-transfer structure. This is one of the few ways in which those with the very lowest incomes can share directly in tax reduction.

Comment noted on page 35 by Mr. Beirne, Mr. Hayes, and Mr. Reuther, joined by Mr. Bell and Mr. Young:

It is our considered judgment that urgent social needs must be met, even if meeting them requires some reallocation of the resources left available for nonmilitary purposes after fulfilling the requirements of the Vietnam situation.

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*For comment by several Commission members, see p. 42.

Comment noted on page 41 by Mr. Beirne, Mr. Hayes, and Mr. Reuther, joined by Mr. Young:

We are fully in accord with the recommendation that the minimum income allowance program "should be designed to approach by stages the goal of eliminating the need for means test public assistance programs . . . ." Experience, unfortunately, indicates that the States too often reduce welfare payments when other sources of income are available to welfare recipients. We therefore would urge that pending the full development of the minimum income allowance program, reasonable Federal minimum standards be established for all welfare payments to which the Federal Government presently contributes, and that a national general assistance program conforming to those standards be created for all those in need who do not fit into the categories covered by the present federally aided welfare programs. Consistent with the minimum income allowance recommendation, minimum benefits under the wage-related social insurance programs should be raised above the poverty level.

FACILITATING ADJUSTMENT TO CHANGE: Public Policies

The preceding chapter has expressed the firm conviction of the Commission that the most important way to facilitate adjustment is to assure workers that jobs or income will be available in case they are displaced from present employment. The Commission has recommended: (1) fiscal policy calculated to provide at all times a brisk demand for labor; (2) direct employment of any long-term residue of unemployed workers; and (3) income maintenance for families with inadequate earnings. These basic policies are indispensible. But many other things could be done to increase the efficiency of the economy and reduce the burden of displacement and frictional unemployment. The purpose of this chapter is to identify and discuss these policies under the general headings of education and training, matching men and jobs, and regional adjustment.

The Commission is fully aware of the significant progress that has been made in our society toward reducing frictional unemployment. Many important aids to adjustment have been developed through public policy. Examples are improvements in education, retraining, and relocation assistance. Similarly, through private initiative, many methods of softening the blow of change have been devised, among them, severance pay, early warning, company assistance in retraining and placement, and vesting of pension rights. In recent years, the pace of progress in this direction has quickened substantially. Disturbed by the economic and human costs of persistently high unemployment, the Nation in both public and private sectors has sharpened old tools and developed new ones. Many of the new policies and techniques are in an experimental stage and their capacity is not equal to the need, but the Commission recognizes and commends the progress, and its recommendations are made in light of that progress.

A. Education and Training [1]

The encouragement of an adaptable labor force fostered through education and training is second in importance only to provision of adequate employment opportunities in the facilitation of adjustment to technological and other change. We wish to emphasize at the outset that we regard the goals of education as far transcending economic objectives. These goals go beyond economic progress to the development of individuals as persons and as responsible citizens. A clear division of education into its "economic" and "noneconomic" aspects is impossible. For example, broad general education has close relevance to the preparation for vocations, and training that is intended to be technical or vocational may have equal relevance to the development of individuals as persons and as citizens. Our discussion of education tends, therefore, to be relatively broad.

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[1] In relation to this section, see Howard Jones, et al., *Education in the U.S.: Status and Prospects* (†); Don D. Bushnell, et al., *Computer Technology and Educational Progress* (†); and James D. Finn and Gabriel Ofiesh, *The Emerging Technology of Education* (†).

From the purely economic point of view, education has three principal effects: (1) It can increase the versatility and adaptability of people with respect to vocations and thus increase their capacity to adjust to change; (2) it can open up increasing opportunity to persons who might otherwise have difficulty in finding and holding employment; and (3) it can increase the productivity of workers at any level of skill or ability. Though education is much more than a means of economic progress, it is a decisive factor in the economic advancement of any country.

Education is a source of versatility and adaptability because it provides basic knowledge and skills that are usable in a wide variety of situations. Such knowledge and skills include the ability to communicate through the written and spoken word, the ability to calculate, familiarity with basic science, habits of rational thought, and an understanding of society. This kind of versatility derives largely from general education in the sciences, mathematics, language, literature, art, and social science. Education also helps people to adapt when it offers them, throughout their lives, the training they need for new kinds of jobs. Education helps people adapt when it gives them the ability to keep abreast of labor market information about new opportunities in unfamiliar industries or in distant parts of the country. Education—both general and vocational—can clearly increase the productivity of workers at all levels of skill and ability by imparting new, or renewing old, skills and abilities.

Education can open new opportunities to those persons at the end of the queue who have difficulty in finding and holding jobs. Some people are handicapped by discrimination based on race or religion or national origin, some by cultural deprivation, and some by physical, emotional, or mental disorders. Education, combined with counseling and with understanding and receptivity on the part of employers, can help such people to compete for jobs. These measures can be effective, however, only if there are jobs available. Otherwise, the upgrading of those at the end of the queue will merely move them up the line in preference to others. The solution of unemployment need not await the provision of adequate education to all, as desirable as that goal is.

It is our firm conviction that educational opportunity should be open to all. A first principle of a progressive and humane society is that no person shall be deprived by financial barriers or by barriers of ethnic or national origin, religion, age, place of residence, or background, of the opportunity for maximum growth and development through education. This is a goal to be pursued continually with both quantity and quality of education in view. The need is greatest among the culturally deprived, and special emphasis should be given to education for these groups. Significant progress toward this goal has been made in recent years, but neither accomplishments to date nor concrete plans for the future are sufficient to achieve fully what must clearly be a national goal of highest priority.

We welcome the substantial progress of recent years. Between 1957 and 1958, and 1964 and 1965, total educational expenditures have increased from $21 billion to $39 billion. The recent surge of Federal educational legislation portends further progress in the near future. This legislation includes the National Defense Act, the Education Facilities Act, the Vocational Education Act, the Higher Education Act, the Primary and Secondary Education Act, the Manpower Development and Training Act, and others. Notable progress has also been made through the efforts of State and local governments and private educational institutions.

The educational needs of our society include more extensive and better education at all levels, from nursery to the university. Within this broad field, we offer several specific recommendations.

1. High quality compensatory education should be available to every child whose life opportunities would be improved by it. Perhaps the most serious deficiency in our educational system has been the inadequate opportunities available to those in greatest need, namely, children of families and communities where there is cultural deprivation, segregation, or isolation. The Economic Opportunity Act and the Elementary and Secondary Education Act are a beginning. However, the first effort of Operation Head Start was but a skirmish. Significant at it was, its main effect was to demonstrate the inadequacy of available facilities. No one believed, of course, that a brief summer's experience could compensate for years and even generations of cultural disadvantage. In the future, the program must provide longer sessions with better facilities and larger numbers of experienced and qualified teachers. According to the Office of Economic Opportunity, at least 100,000 additional classrooms and 133,000 teachers would be necessary by 1970 to provide compensatory full-year education from ages 3 to 5 for all who are in need of it.

2. The quantity and quality of primary and secondary education, especially in low-income urban areas and rural backwaters, should be improved. There is a wide gap between educational standards in high-income and low-income areas. It should be eliminated by providing excellent education in the underprivileged and depressed areas.

3. High school graduation should become universal. During the recent years of high unemployment, justifiable concern about high school dropouts has mounted. It is generally accepted that those with less than a sound high school education are unprepared for both employment and life. Progress is being made. The percentage of each population cohort completing high school has increased from 51 percent in 1940 and 59 percent in 1950 to 77 percent in 1964. The gap should continue to be closed. To accomplish this, both the problem of motivation and inadequate family income must be faced realistically. Otherwise, economic improvement may actually increase the number of dropouts as jobs become more easily available. The task is neither easy nor cheap, but experimentation has suggested answers, for example, ungraded classrooms with increasing individual attention, work-study arrangements, and income-mainte-

nance policies to make it unnecessary for young people to neglect their education because they must augment family incomes.

4. For most secondary school pupils, vocational training should be deferred until after high school. The high school should emphasize broad general education in language and literature, mathematics and science, history and social studies, and the arts. These subjects are an essential foundation not only for personal development and citizenship but also for most vocations. General education is especially necessary in a rapidly changing economy in which versatility and flexibility are at a premium. The training for many—perhaps most—specific jobs can and must be done on the job as a responsibility of the employer. However, there are some pupils whose greatest potential can be realized through occupational-vocational-technical education. Such education, with a parallel program of general education, can equip them with both job skills and a solid foundation for the adaptability necessary in a dynamic society. It can help implant the important understanding that education is a continuing process of self-renewal indispensable for continuing adaptability in a changing world. The design of occupational-vocational-technical education to achieve these purposes represents a significant challenge to the educational community.

5. A nationwide system of free public education through 2 years beyond high school (grade 14) should be established. The key institutions would be area technical schools and community colleges. The public vocational-technical schools would provide training in trade, technical, and business occupations at the skilled worker level. The community colleges would provide liberal education as well as technical and semiprofessional training. The two types of schools might in many instances be merged into a community education center offering both the theoretical foundation of trade, technical, and business occupations and the opportunity to "learn-by-doing" while pursuing liberal education or semiprofessional training. Most of the students in both types of institutions would be high school graduates, though provision could also be made for former high school dropouts, college transfers, and adults. Remedial courses could be provided for those whose earlier preparation had been inadequate and for continuing education for adults with adequate educational foundations.

6. All qualified students should have realistic access to university education. General education should be emphasized in the undergraduate years. With a nationwide system of community colleges, the standards for entrance to the university should be established at a level appropriate to work of true university grade. The university is an institution of strategic importance to technological advancement, both as an educational and as a research institution.

7. No qualified student should be deprived of education at any level because of his family's lack of financial resources. Our recommendations for full employment and income maintenance and for free public education through 2 years beyond high school should make education for every young person financially possible through grade 14. At college or the university, support for both tuition and maintenance when needed should be available through scholarships, loans, and work. We recognize that there will also be cases in which

qualified students are prevented from completing high school or college because their earnings are needed by their families. Until adequate income maintenance programs are available, additional assistance will be necessary in these cases.

8. Education, training, and retraining should be available to individuals throughout their lives. The ability to manage change—whether to keep up with new developments in a profession or to retool for a new job—requires that continuous education be available when needed. Access to education governs the pace at which new knowledge can be absorbed, adjustments made to new technologies, and solutions reached to related social, political, and economic problems. The lifelong learning process has both a formal and an informal side. Learning occurs not only in the class, the extension course, and the lecture series; it also takes place in individual reading, television programs, and instruction on the assembly line. The system of public education, however, should provide a comprehensive program of educational opportunity for persons of all ages and of varying educational attainments. A system of education that is open ended, with freedom for mature students to enter, leave when alternative experiences seem more fruitful, and then reenter, can be a reality through the coordinated efforts of public schools, community colleges, vocational schools, universities, and employers. The lifelong learning process, which must be in a fundamental sense a program of self-education, can be materially aided by formal educational programs. But above all, starting at the earliest levels the educational process must seek to impress upon the individual the need to assume responsibility for continuing self-education and self-renewal for meaningful adaptation to a changing environment.

9. A special need is to provide more extensive education opportunities for adults whose basic education is deficient. Many are virtually illiterate or otherwise seriously handicapped educationally. It must be recognized that every effort to improve the education of those now in school will increase the disadvantages of those with substandard education. About 30 million members of the present work force are without high school diplomas, and 8 million have not completed eight grades. One-sixth of American youth cannot qualify for military services because they are unable to pass a seventh grade equivalency examination. Two-thirds of the heads of poor families have less than an eighth grade education. The Welfare Administration of the Department of Health, Education, and Welfare estimates that the great majority of those eligible for its training programs are in need of basic education. Many other indications of the need for adult education could be cited. Yet the opportunities for adult basic education are few, the problems of motivation are practically unsolved, and new approaches and techniques are needed. Recent developments in educational technology appear to have special applicability to the needs of the adult learner. Imaginative efforts in many communities indicate that obstacles can be overcome. Experience has shown that employees are more likely to take advantage of supplementary education if provided at the workplace.

10. The Manpower Development and Training Act has made a start in the retraining of employees and the unemployed. But the program must still be

described as experimental in scale; we recommend that it be expanded. Stieber points out that training allowances under the U.S. program are far smaller relative to wage rates than those in European retraining programs. With labor markets tightening, retraining has added urgency.

11. The laws of some States prevent unemployed workers from receiving training while drawing unemployment insurance. Such laws should be changed by Federal and State action. In the long run, unemployment insurance funds would probably be saved by offering a monetary incentive (over and above unemployment insurance benefits) for training to be at least equal to the added clothing, meals, transportation, and tuition costs involved.

12. Training and retraining for most jobs occur at the workplace as a responsibility of the employer. The members of the Commission have been impressed by the extensive and increasing amount of training and education that occurs within private business, and also by the relative speed with which new jobs can be learned by American workers. Effective as on-the-job training is for the teaching of specific skills, it is limited in its ability to review and improve basic education. The community must take major responsibility for the latter. However, added incentives could be given to encourage workers to undertake educational programs outside working hours.[2] One promising approach would be for management and labor to develop programs under which workers would be encouraged to engage in full-time education during periods of layoff and during negotiated sabbatical leaves.

13. It has been far too common in the tradition of mass free education to ascribe inadequacies to the individual student rather than to adapt educational techniques to meet the needs or to overcome the limitations of individuals. Reducing economic barriers helps those who can succeed in the well-established techniques of formal education and training. They do nothing for those in and out of school who cannot make effective use of established patterns and approaches to education. The task of expanding educational opportunity must also focus on adjusting the system to meet the needs of those who cannot make effective use of existing educational methods. A considerable amount of experimentation and research in applying computer and information technologies to educational problems is under way. Much of what is being done bears on compensatory educational techniques for disadvantaged people in the labor force and on the development of a system of continuous, lifelong education.

Through newer techniques, a wider variety of individual learning behaviors and motivations can be recognized and accommodated. The new technologies can also relieve teachers of mechanical and administrative chores so that they can spend more time helping individual students. New information technologies are also being applied to keeping curriculums up to date in a wide variety of subject matter areas. The experimentation with new educational technologies has thus far been limited in scale, but the results have been exciting in regard to

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[2] Great Britain recently passed the Industrial Training Act which imposes a training tax on all employers that is rebated to those who establish approved training programs. Small employers may pool their training efforts in order to obtain the rebate. No experience has yet been accumulated.

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expanding educational opportunity to those who have heretofore been regarded as poor learners or poorly motivated.

14. In retrospect, one of the highest return investments we as a nation have made was the GI bill following the Second World War and the Korean war. Not only did we aid veterans to make up lost years but we brought about a veritable social revolution. Men and women whose backgrounds precluded the possibility of higher education and advanced training were lifted into totally unexpected positions in life. And in simple monetary terms, the investment has already been returned in taxes on their higher incomes. The lesson should not be forgotten or neglected.

The Commission regards universal and widespread education as one of the most important goals for America. Heartening progress is under way. But enormous tasks lie ahead before the potential inherent in our human resources is realized, and before the promise of equal opportunity in a democratic society is fulfilled. The Commission feels strongly that educational programs of high quality should be available to *all* youth. By high quality we refer to programs with adequate resources, well-trained teachers, suitable buildings, and appropriate curriculums and educational methods.

B. Matching Men and Jobs

Adjustment by workers to technological and other change would be helped by improved operation of the labor market. Frictional unemployment can be minimized only if workers seeking jobs and employers seeking workers can be brought together efficiently.

The labor market is a complex market, or group of markets, including all classes of workers from the unskilled to professionals and executives. The labor market for most occupations is local, but there are regional and even national markets in some occupations. There is a tendency for markets to widen as mobility increases. In many cases, necessary or desirable adjustments to change involve long-distance moves, even coast-to-coast, and require a communication system that is nationwide.

Labor Market Information

The first requirement for an orderly labor market and satisfactory adjustment to change is adequate information. Alternative employment opportunities are real to the individual only if he is aware of their existence. Displaced workers, those vulnerable to displacement, and those who want to improve their standing in the labor market can make reasonably appropriate decisions only if they have information, not only about present opportunities but about the future outlook for alternative occupations.

The job seeker, whether unemployed or seeking better employment, has little information available concerning alternative job openings. Many placement agencies, labor unions, trade associations, and other organizations are involved in the process of matching men and jobs. Most of them serve limited clientele, usually skilled and professional workers and executives. Only the public employment services are available to all and serve the full range of occupations. Yet they have information available only on those job openings which are listed with them by employers; and employers can learn from the public employment service only of that minority of workers who are registered there. Most information concerning job opportunities passes by word of mouth through an informal but effective grapevine, but the information provided is of limited scope.

The Bureau of Labor Statistics makes reasonably accurate long-range projections of national employment trends by occupation and industry. The U.S. Employment Service and its affiliated State agencies supply increasing amounts of information about local employment trends. But there is simply no place in any local labor market, let alone on a regional or national basis, where individual job seekers or employers can discover the full range of possible jobs or employees available. The outlook for employment at the local and regional level and the probable durability and potential of any choice made is usually unknown to the individual. The adjustment process can be improved considerably through provision of more and better information concerning present opportunities and their future promise. Some of the needed improvements follow.

1. To give job seekers and employers access to specific job openings and potential employees, the Commission recommends that a computerized nationwide service for matching men to jobs be established. The technical feasibility of such a system has been established in studies sponsored by the Commission. With local centers feeding into regional centers information relevant at that level, and these in turn feeding into a nationwide job and manpower bank, the service could provide detailed information on the manpower requirements of job vacancies and the personal characteristics of job seekers.[3] The technological knowledge is available for the development of the equipment and the costs are within reason. Problems relating to the most effective methods of coding and similar problems remain to be worked out, but these can be solved if the commitment is made to develop the system.

The proposed communication system could be organized in several ways. It could be a nonprofit public service corporation with joint public and private ownership, or a part of the U.S. Employment Service. Each has advantages and disadvantages. The question of the appropriate form of organization is subsidiary to the basic recommendation that the system be established. However, some of the Commission members prefer the first possibility. The Commission believes that it would be sound policy for employers to list all or most job openings through some generally available mechanism. The proposed system would strongly encourage such listing. An obvious beginning would be for the Federal Government to list all of its openings with the system through the U.S. Employment Service.*

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[3] In cooperation with the U.S. Employment Service, the State of California has experimented with a computerized system and further experimentation is now contemplated on an interstate basis.

*For comment by several Commission members, see p. 56.

The operation of the system, if it were organized as a joint public-private corporation, would be as follows: Every employer could, if he wished, have in his own establishment a terminal giving access to information concerning the detailed characteristics of all job seekers. Employers could themselves choose whom to interview rather than depend upon others to refer prospective employees. Small businesses might have access to the system through jointly operated terminals or by placing job orders with the employment service. The job seeker would participate in the system either directly or through his own chosen representative—the public employment service, a private employment agency, either fee-charging or eleemosynary, a labor union, or some other agency which, through its own terminal, would have access to the requirements of prospective employers. Either employer or employee could place any desired restriction upon use of the information supplied, and appropriate safeguards could be established to guard against invasion of privacy.

If the communication system were a separate enterprise, the public employment service would be relieved of a purely mechanical function and allowed to focus all of its resources upon the needs of the unemployed and those seeking better jobs. The job seeker, in turn, could pursue his job search in an orderly fashion under the auspices of the public employment service or other employment agency. Alternatively, the operations of the public employment service might be computerized with local systems linked into a national system. The question of the appropriate ownership of the employment information system is separate from the desirability of the system itself. We recommend its careful study.

2. To warn of vulnerability to displacement and aid rational choice among alternatives as well as provide businessmen and public officials with better tools for long-range planning, short- and long-term forecasts of local and regional occupational demand and manpower availability should be improved and made more readily available. A focal point should be established in each community, probably in the local public employment service, where national trends and information from local businessmen, public officials, universities, and other sources can be translated into 1 to 10 year forecasts of likely local and regional manpower and employment developments. Not only employees and employers but those concerned with counseling and guidance, educational and urban planning, and economic development would be assisted by such guides to future prospects.

The Public Employment Service

The public employment service is federally financed but State operated. Some States operate imaginative, efficient employment services; others appear to have less effective services. There is need for high nationwide standards. Moreover, labor markets are not necessarily organized according to State boundaries. While the markets for some skills are intrastate, many labor markets overlap State boundaries and many are regional or national. Interstate cooperation among the State services exists at present, but appears sporadic and slow. State salary structures impede recruitment of quality personnel. The present system is not well suited to innovations like the computerized job infor-

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mation service which should operate on a nationwide basis. For all of these reasons, we believe the public employment service should become a Federal agency and then be provided with the resources to do its job.*

Geographic Relocation

While encouragement of labor mobility is essential, emphasis should be placed on attempts to rehabilitate economically distressed areas through regional planning and Federal financial and technical assistance. Efforts should be made to bring jobs to areas where workers live and to utilize fully existing social investments in community facilities, schools, churches, etc.

The availability of alternative sources of employment may be of little value to the displaced employee if they are too far away. The problems of depressed areas have received considerable attention in the past few years but are still far from solution. Economic and technological changes leave regions and their people isolated, stranded, unemployed, and poor, their resources and social investments underutilized or abandoned. The initial approach, appropriately, was to attempt to bring the jobs to the people, many of whom had been isolated from the economy's mainstream by the vagaries of technological change. The public obligation to give a geographical dimension to the freedom of occupational choice was first recognized in the labor adjustment provisions of the Trade Expansion Act. Subsequently, positive support was provided in the 1963 Amendments to the Manpower Development and Training Act. Not as a general policy but as an experiment and as a demonstration, the Secretary of Labor was authorized to provide grants and loans to cover the direct costs of workers moving from labor surplus areas to promised jobs in more favorable economic areas.

At first, the program was burdened by the generally high levels of unemployment. As labor markets have tightened around the country, the availability of relocation assistance is demonstrating its value. Much should be learned from the current experiments in the design of a permanent program.

In such relocation efforts, careful consideration must be given to the total consequences. There are values in stable communities; when it is possible, economic development should be promoted in declining areas. We commend the continuing experimentation which is going into the rehabilitation of Appalachia and other depressed areas.

To people whose experience and resources are limited, fear of the unknown is probably a more important obstacle to geographical mobility than the financial cost of moving.[4]

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*For comments by Commission members, see p. 57.

[4] A successful relocation program will require advance information on the nature of job opportunities, housing, and transportation. It may be necessary to meet the losses entailed in selling a house in an area of falling employment. Such losses are frequently absorbed by firms transferring their managerial personnel or engineers and scientists, but seldom for industrial workers.

The worker and his wife will need an opportunity to visit the prospective community. Counseling will be needed at both ends of the transfer, as well as assistance in finding housing and fitting into the community. For many, close followup for substantial periods may be necessary to prevent discouragement. New jobs must be found when others are lost. All these and moving costs, too, will often be necessary. Even then relocation will make a marginal, though worthwhile, contribution to adjustment.

Another important obstacle to the geographical matching of men and jobs remains almost unnoticed. Part of labor displacement results from the tendency of industry to follow the movement to the suburbs, while the poor, many of whom have been victims of technological change in agriculture, remain trapped in the central city. If one is too poor to own and operate an automobile it may be literally true that "you can't get there from here." [5] A solution to this problem is essential, not only for adjustment to technological change but for the attack on poverty and the reduction of riots and strife.

Eliminating Social Barriers to Employment [6]

The process of successful adjustment can also be impeded by any number of social barriers which bar certain workers from certain jobs. These practices include discrimination based on race, age, or sex and arbitrary control over hiring or training, as in certain apprenticeship programs. Such practices cannot be condoned for they prevent the Nation from fully using its human resources or using them efficiently. The government has through legal and administrative actions attempted to eliminate these practices. However effective it has been, the road to realistic solutions is a long one.

This Commission has taken special cognizance of the civil rights "revolution." The heart of the problem faced by Negroes as they strive to enter the mainstream of American economic life is employment opportunity. That this also lies at the heart of adjustment to technological change is no surprise. Therefore, it is clear that a healthy, rapidly growing economy is a necessary condition for Negro progress. However, by itself it is probably not enough. For more than 300 years, the Negro has been systematically denied his rightful place in American society. This denial has taken its toll in many ways. In order to develop and use fully the potential of America's Negroes, special programs will be needed—programs which systematically attempt to compensate as rapidly as possible for 300 years of systematic denial. The cost of these programs will be high, but it will be small in relation to the human costs of 300 years of deprivation, and it will also be small in relation to the benefits society will reap. It is probably fair to consider such expenditures in much the same light as we considered expenditures for returning GI's after the Second World War. Only now are we fully recognizing the benefits of this investment. The same will be true of the special programs which will permit Negroes their rightful place in a democratic society.

C. Facilitating Regional Adjustment*

All regions have not shared equally in the unprecedented economic growth that this Nation has enjoyed since the end of the Second World War. The economies of many regions have, in fact, declined, leaving pools of unemployment, poverty, and hardship. In a dynamic economy characterized by technological change as well as by shifts in demand, depletion of resources, and other locational factors, such geographic inequities can perhaps be expected—but this does not lessen the hardships involved. Following are some examples of the regional changes that occur and problems that result:

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[5] One member of this Commission, before the Los Angeles riots, had some of his students conduct an experiment in the Watts area. They were instructed to travel by public transportation from the center of Watts to various areas of employment throughout the city. Most of the trips involved several bus changes and at least 1½ hours of travel *each way*. It was literally impossible to get from Watts to one important employment area by public transportation in time for work in the morning.

[6] In relation to this section, see M. T. Puryear, *The Negro in the American Economy* (†).

*For general comments on this section by several Commission members, see pp. 57–58.

a. The introduction of improved coal-mining equipment plus the increased use of petroleum and natural gas as a source of energy contributed to the problems of Appalachia.

b. The development of new agricultural machinery and chemistry resulted in the emergence of large, highly mechanized and industrialized farm operations which reduced labor requirements in predominantly agricultural areas.

c. The replacement of steam locomotives by diesel engines destroyed the economy of communities whose function was the repair and maintenance of steam-operated railroad equipment.

When the impact of economic and technological change has caused certain regions to fall behind the progress of the Nation as a whole, the Federal Government has found itself with new responsibilities. Usually the forces impinging upon the declining regions are beyond their control. In addition, various Federal programs have sometimes unwittingly contributed to regional problems. For instance, Federal housing policies have contributed to urban "sprawl" and the defense and space programs have redistributed manpower resources, concentrating scientists and engineers particularly in only a few regions. The resources and too often the leadership available at the regional level are limited. In recent years Congress has provided assistance to "distressed areas" through the Area Redevelopment Administration, the Manpower Development and Training Act, the Economic Development Administration, the State Technical Services Act, and the special program for Appalachia. But so far, the Federal Government has found it difficult to cut through the layers of State and local governmental structure involved to get to the heart of the problem of local economic growth.

There are no easy solutions to the problems posed by regional economic dislocation. In the final analysis, however, the Nation is faced with the choice of rebuilding and assisting distressed communities until they become self-sustaining, or of abandoning them altogether. As a wealthy nation, we do have the resources, and assistance to such communities can be considered an investment in the Nation's future. This Commission believes that a concerted effort to revitalize potentially viable communities is required. Such assistance should be designed to encourage self-help within the community, and should be formulated with the needs of the entire regional economy in mind. The types of assistance needed include the following:

1. A comprehensive economic analysis must be the first step. Such an analysis must clearly identify the current and likely future problems which face each region and the resources available to meet these problems.

2. Wherever possible, new technological developments should be used to stimulate regional economic growth. Information about new technology must be made available to each region, and each should be assisted in applying this information. The recently enacted State Technical Services Act may help in this regard, although more emphasis on a regional rather than State orientation appears to be required.

3. Assistance in the form of venture capital is required to permit each region to take full advantage of the opportunities presented by technological change. Such capital is needed to encourage entrepreneurship and to stimulate the development of new industry based on the emerging technologies.

4. Direct financial assistance is needed to help distressed communities update and improve education, highway, and service facilities (water, sewage, etc.). Improved schools and other institutions for upgrading human resources are particularly important. When developed as part of an overall plan, the improvement of such facilities could provide both the physical base and the stimulus for self-sustaining economic growth of the community.

A better understanding of what constitutes an "economic region" and an administrative framework capable of approaching the problem on a broad regional basis is required in dealing with the problems of regional economic growth and adjustment. The boundaries of economic regions must generally be drawn without regard to State lines. At the present time the Federal Reserve System seems to offer the most viable mechanism for developing and implementing regional programs. Federal Reserve Districts have several advantages as bases for regional development programs: the Federal Reserve Districts approximate existing regional economies; they are already established; and, since the Federal Reserve System is closely associated with private banking institutions, it could effectively stimulate the application of private funds to the development of local and regional economies. Specific recommendations in this respect include the following:

1. Each Federal Reserve bank should establish a regular program of regional economic analysis as a means of continually evaluating the problems and opportunities facing the region. The Federal Reserve banks of Boston and Minneapolis, which have conducted such programs in the past, have successfully demonstrated the role the Federal Reserve System can play in the formation of regional economic goals and the policies to meet those goals.

2. It is recommended that each Federal Reserve District establish an "advisory council for economic growth" composed of leaders from business, labor, government, the universities, and other interested groups within the district. The council's activities should include the identification and interpretation of all factors affecting or likely to affect the economic well-being of the district. On the basis of this analysis the council should prepare comprehensive program and policy recommendations directed at both public and private institutions within the district; the council itself would have no action authority.

3. Capital banks should be established within each Federal Reserve District to provide venture capital and long-term financing for new and existing companies. It is suggested that these venture capital banks be financed with private funds insofar as possible.

4. Regional technical institutes should be established within each region to keep abreast of new technological developments. Innovations applicable to such regional needs as pollution, transportation, education, and health, as well as those offering opportunity or threat to the region's economic structure would be of particular interest. An important function of these institutes would be to assist new and existing firms to take maximum advantage of the opportunities offered by technological advance.

5. A high-level Federal executive is needed within each region to coordinate the efforts of various existing Federal programs at the regional level. This regional Federal executive could also serve as a focal point for Federal contacts with State and local programs.

The Nation can meet its goal of maximum economic growth and its commitment to provide all of its citizens with the opportunity to share in the national prosperity only when the resources available in all sections of the country are utilized to their full potential. The recommendations outlined are designed to meet this goal.

Comment noted on p. 50 by Mr. Hayes and Mr. Reuther, joined by Mr. Young:

We share the view that the President should be urged to issue an Executive order under which all Government procurement contracts would require the contractors to list with the public employment service all job openings to be filled by new hires.

The steps proposed in the report to encourage voluntary listing of other employers' job openings with the service should be given a trial. If, however, they fail to achieve comprehensive listing of job openings, we will need legislation directed toward that end. Such legislation should deny experience-rating tax benefits under the unemployment insurance laws to employers who refuse to list their job openings with the service.

Where union hiring halls or other union-management arrangements are in operation, they would be acceptable in lieu of listing with the service.

Further, a new Federal standard should be adopted for the State unemployment insurance laws which would prevent the States from requiring claimants to make an independent search for work in addition to registering for employment with the service.

At present, the service is the victim of a vicious circle. The "independent search" requirement herds workers to the hiring gates of employers, thus relieving them of the necessity to list their job openings. Qualified workers not claiming unemployment insurance do not register with the service because employers do not list openings with it. Many employers do not list their openings because the service cannot provide such qualified workers.

Comment noted on p. 52 by Mr. Sporn:

I fully agree with the need for raising the level of performance of many of the State employment services. However, the basis for choosing federalization of the State employment services as the means to that end, here developed, is that State operation yields differing degrees of effectiveness among the States. This would appear to provide the most convincing argument for continuance of State-operated employment services. There would thus be assured the continued diversity of approach and experimentation, with the excellent performance of some acting as a spur and encouragement for others to meet or surpass the standards of excellence clearly demonstrated as possible. It is disappointing to have the report take a defeatist position and advocate federalization. I am fearful that such a step would discourage experimentation and would assure uniformity but on a general level of mediocrity.

Comment noted on p. 52 by Mr. Haggerty:

I am in general agreement with Mr. Sporn's comment on this point. I am particularly concerned that federalization could interfere with the flexibility of the State system which allows it to respond to local needs. But I would emphasize the need for a strong Federal role in the interstate aspects of employment service activities.

Comment noted on p. 53 by Mr. Sporn:

The problem of the economically distressed regions that have failed to participate adequately in the Nation's economic growth and development is one that merits a great deal of effort to find a solution. I strongly endorse such efforts as those being made by the Appalachian Regional Commission. I regret, however, that I am compelled to dissent from the superficial analysis and bromidic prescriptions for the problems of regional economic distress presented in this report.

I can see no merit in the suggestion that the Federal Reserve Districts and the Federal Reserve banks assume responsibility for regional economic development programs, nor has there been any evidence that regional technical institutes can contribute significantly to the development of economically distressed areas. Indeed, while technological change may account for some regional dislocations, such dislocations can be traced, in far larger measure, to other causes. For example, in Appalachia the difficulties of the coal industry are largely attributable to the rise in the level of economic well-being and the consequent shift in consumer preference for fuels other than coal that are more attractive and less burdensome to use. That the coal industry, in the past 4 years, has been able to reverse its decline and grow by about 25 percent is largely attributable to the introduction of new technology that has made possible lower costs and lower prices.

While I concur with the intent of this section to promote greater regional development efforts, I believe that this complex subject requires far more study and careful analysis than is presented here. There is a great deal of diversity among regions, and even in the case of Appalachia, the region is characterized more by diversity among its several parts than by any uniformity. The solution of regional problems, therefore, requires earnest and careful study and the development of programs at the regional and local level to develop solutions suited to the particular conditions in each case. I am, therefore, compelled to dissent from the analysis and recommendations presented here because I believe that they can only result in misguided efforts that would fail to contribute to the solution of the problems of economically depressed areas, and could even intensify their distress.

Comment noted on p. 53 by Mr. Beirne, Mr. Hayes, and Mr. Reuther:

While we do not associate ourselves with Mr. Sporn's comment on this subject, we do share his opposition to the suggestion that the Federal Reserve Districts and the Federal Reserve banks are the appropriate units for regional development purposes. In addition, we believe that intensive study should be given to regional development experiences in other countries with a view to learning what might be applicable to the United States.

FACILITATING ADJUSTMENT TO CHANGE: Private Policies

The emphasis placed thus far on public policy is not intended to imply that the Federal Government has the sole responsibility for adjustment to technological change, for such adjustments occur constantly without governmental assistance. Indeed, one of the principal strengths of our private enterprise system is its flexibility in permitting changes to occur. To be sure, the Government's role in this connection is important: to provide a favorable environment for change and to act cooperatively with private parties when its assistance is needed. But in the final analysis, the parties themselves must make the decisions and work out the detailed problems of adjustment. It may be added that the private sector accounts for more than four-fifths of wage and salary employment and an even greater proportion of total employment.

Most changes are of manageable proportions; they involve a relatively small number of persons and have their own unique characteristics and requirements. Thus they do not lend themselves easily to imposed governmental solutions, which by their very nature must be comprehensive and general. On the other hand, an effective private adjustment program may receive substantial support from available public resources.

The presence of privately developed programs decreases the pressure for general legislation. Simple mechanisms which can be applied flexibly to individual situations are preferable to legislation, and for this reason public policy in recent years has concentrated on giving administrative and financial aid to private adjustment mechanisms.

In effect, governmental policy has provided more, not less, private flexibility in coping with the adjustment requirements of technological change. This orientation is designed to meet the mutual needs of management and labor and deserves their joint support.

A responsible private manpower policy—an essential element in the successful adjustment to technological change—must necessarily do more than cushion the adverse impacts of change. It must also exploit the considerable opportunities created by technological change to develop new and more rewarding jobs for the people it displaces.

The recommendations in this report are directed at developing a society in which as many people as possible contribute creatively to change and share in its benefits. Such a society is both desirable and attainable, not in spite of modern technology, but indeed, because of it. Thus, these recommendations are not intended to substitute government fiat for private judgments; rather, they are designed simply to assist employers and employees to work out their own adjustments.

A. Requirements for Adjustment

Whatever the characteristics of a given situation brought about by technological change, an adequate adjustment program must satisfy certain basic requirements. First, those displaced should be offered either a substantially equivalent or better alternative job or the training or education required to obtain such a job. This objective cannot be achieved unless displaced workers have access to the full range of available alternatives. Second, they should be guaranteed adequate financial security while searching for alternative jobs or while undertaking training. Third, they should be given sufficient financial assistance to permit them to relocate their families whenever this becomes necessary. Fourth, they should be protected against forefeiture of earned security rights, such as vacation, retirement, insurance, and related credits, resulting from job displacements.

Many private adjustment programs, formal as well as informal, go far toward meeting these basic requirements. To illustrate, 40 percent of the approximately 8 million persons who changed employers in 1961 experienced no unemployment in the process. Even that figure is probably understated because it excludes successful job changes within a given company. Another 25 percent were employed again within 4 weeks. Job changes were attributable about equally to three causes: voluntary moves to improve status, involuntary loss of jobs, and shifts resulting from illness or from other personal reasons.

It is difficult to estimate how many persons are covered by adequate adjustment programs. Beyond the well-known formal and collectively bargained programs, much is undertaken by managements on their own initiative or in conjunction with public agencies and community service organizations. Qualitative assessment is also difficult. Because of the dearth of available information, we suggest that the Department of Labor and the Department of Commerce systematically investigate and report publicly on successful private adjustment programs developed through either collective bargaining or the unilateral efforts of management. This would not only add to the present store of general knowledge about the adequacy of adjustment coverage, but also would permit more extensive communication about effective adjustment programs among and between employers, employees, and unions.

As increasing attention is given to adjustment programs, standards of adequacy are bound to rise; today's more advanced ideas will be commonplace tomorrow. We may expect not only wider variety in the methods of adjustment, but also greater flexibility. For example, employers should be encouraged to give employees a chance to try new jobs without forfeiting their rights to old jobs. Assurance to workers that they are not limited to one irrevocable choice among several alternatives may remove a major cause for resisting adjustments to change.

B. Methods of Facilitating Adjustment to Change

There is general agreement that wherever possible reductions in the work force necessitated by technological change should be accomplished by attrition. The extent of reliance on attrition, however, could be increased by better manpower planning.

One of the main objectives of manpower planning is to obviate the need for sudden and substantial layoffs and ease the impact on those who must be displaced. By studying attrition ratios and the age structure of the work force and by attempting to project manpower requirements, employers could do a better job of integrating hiring and layoff policies with the introduction of change. For instance, to the extent that necessary adjustments are made in a period of generally good economic conditions when job alternatives are relatively abundant, the burden of unemployment during less prosperous times is correspondingly reduced. Conversely, when obsolete work and manning patterns persist in an expanding economy, managements are more likely to eliminate jobs during a business downturn, with the result that a displaced employee must look for alternative jobs when they are least available and when his resources are likely to be least adequate.

Because laid-off employees need time to explore alternative job opportunities, Government agencies, unions, and others have increasingly emphasized the need for an "early warning system" which will alert employees to the possibility or inevitability of future compulsory job changes. Formal arrangements for advance notice do exist, but the notice periods are generally relatively short. Managements have been reluctant to enter into formal advance notice agreements for several reasons: fear that the firm's competitive position may be endangered, concern that employees will seek other jobs before the change is actually effected, and apprehension that such advance notice will cause a serious decline in worker productivity. Recent research suggests that employer fears of premature job-changing are largely unfounded, especially if employees must forego severance pay and related assistance should they depart before jobs have been terminated. Fear of reduced employee morale and efficiency also seems unwarranted, especially when managements combine advance notice with assistance to affected workers seeking new jobs.

Although employers must take the initiative in giving advance notice of their own planned technological changes, the broad dissemination of information about general technological developments throughout an industry or region would alert employers, unions, and employees alike to the possibility and timing of changes. Such a general sharing of information could be effected through periodic conferences between Federal, State, and municipal government officials, employers, and unions about the state of technology in various industries and would assist all parties to prepare for impending changes.

The value to employees of advance notice of technological change can be greatly enhanced if it is accompanied by assistance in finding alternative jobs or securing additional training or education. Employees should be given either time off with pay to look for other jobs or financial assistance while they upgrade their skills through additional training or education. Employers willing to lend this type of assistance might well make it dependent upon the employees' commitment to stay at their present jobs through the transitional period.

Alternative or additional assistance can take the form of counseling, job referral service, or on-the-job training, with the last, in particular, offering great potential benefit to employers, employees, and the community at large. It is now generally conceded that the most efficient method of training workers for existing job vacancies is by instruction on the job. However, sufficient knowledge about the potential capacities of employees is lacking; consequently, many are not given training for jobs at the highest levels of their capabilities. The most frequently cited example of this deficiency in current adjustment programs is management's failure to promote more blue-collar workers to white-collar jobs, even though many skilled craftsmen are quite capable of learning work now assigned to junior engineers and white-collar technicians. To the extent that this condition prevails, employers waste existing human assets while substantially raising recruitment costs. To the extent that assistance measures outlined above prevent unemployment, individual managements and the community as a whole would benefit from reduced unemployment insurance costs and, in even greater measure, from the establishment of a more equitable system of sharing the costs of progress.

C. Protecting the Earned Benefit Rights of Displaced Employees

The United States does not provide by law that private as well as public employment automatically carries such benefits as paid vacations and holidays, sick leave, severance pay, and the like. Traditionally, we have relied upon the enlightened self-interest of individual employers or the pressures of collective bargaining to secure these and related benefits for employees. Even in the few instances in which nonwaivable rights have been established by law, some classes of employees remain uncovered.

The principal device developed by American unions to protect the job interests of those they represent is seniority—a system of employment preference based on length of service. Employees with the longest service are given the greatest job security and the best opportunities for advancement. In addition, rights to certain benefits and the amounts of some of them are determined on the basis of seniority. More than any other provision of the collective agreement, seniority affects employees' economic security. In industries characterized by a steady reduction in total employment, length of service is the principal protection against job loss. In cases of mass layoffs, an employee's chances of being retained or recalled will very likely depend upon such factors as the basis for determining seniority preference (e.g., plant, departmental, or craft), the provision for trial periods to "make out" on a new job, and the extent to which "bumping" is permitted.

The seniority principle has become so important that it is embodied in virtually every collective agreement, and it undoubtedly has exercised considerable influence on personnel policies of many unorganized firms. And although it is a creation of a collective agreement and lacks independent legal status, seniority is almost universally regarded by employees as a valuable property right.

It should not be surprising, therefore, that unions usually insist upon the strict enforcement of seniority provisions in their collective agreements, especially in respect to layoffs and recalls. Seniority, however, does not create jobs and therefore cannot be relied upon as the sole protection against technological change. Because of the heavy reliance placed on private arrangements to provide certain benefits and protections to workers, loss of a job usually also entails loss of vacation eligibility, loss of various forms of insurance protection for the worker and his family, and, frequently, loss of pension rights as well.

The loss of pension rights is particularly serious since the worker cannot relive the years during which he accumulated the pension entitlement that vanished with his job. Private pension plans now cover approximately 25 million workers.

These plans differ widely, however, not only in formal structure, but also in eligibility requirements, benefit levels, methods of funding, and vesting provisions. Many assert that pension benefits should be "portable" in order not to inhibit labor mobility, and that in any event pensions are a form of deferred wages which "belong" to employees. These claims have led to frequent demands for compulsory minimum vesting as a condition of approval for any pension plan by the Internal Revenue Service, without which employer contributions cannot be deducted as a business expense. Such a proposal is included in the 1965 Report of the President's Committee on Corporate Pension Funds and Other Private Retirement and Welfare Programs. Opponents argue that the added expense it entails will discourage the kind of experimentation that has brought such vitality to the private pension movement in this country. Whatever the merit of opposing arguments, the most recent survey by the U.S. Bureau of Labor Statistics showed that more than two-thirds of private pension plans, covering 60 percent of employees with private pension rights, included some form of vesting. The Commission takes no position on the adequacy of the pace of this development but hopes that the movements toward portability and vesting will continue.

Of equal or greater concern in the administration of private pension plans are eligibility requirements, investment policies, funding arrangements, and disclosure of relevant information to plan participants. The last problem is at least partially covered by the Federal Welfare and Pension Plans Disclosure Act and by similar laws in some States; but unduly restrictive eligibility requirements and unsound investment policies sometimes lead to the disappointment of legitimate expectations on the part of employees. We favor whatever legislative or administrative measures may be necessary to promote greater equity and security in the establishment and administration of private pension plans. Specifically, we recommend that careful study be given to a legislative system of reinsurance for private pension plans similar to the reinsurance of bank deposits through the Federal Deposit Insurance Corporation.

Although not as widespread as pension plans, profit-sharing arrangements are gaining increasing favor in the American economy, especially among unorganized employers and usually for salaried workers only. As in the case of pensions, employer contributions must be irrevocable; but profit-sharing, which is geared to the actual business performance of the enterprise, permits greater flexibility in the employer's commitment while at the same time allowing for more rapid and substantial increases in the equity of employees of a successful firm. By their very nature, however, profit-sharing plans cannot guarantee the kind of security afforded by pension plans.

An increasing number of workers, both organized and unorganized, participate in group plans for life and health insurance at substantially reduced rates. Severance of employment may present the employee with the equally impractical choices of forfeiting these benefits or converting them to individual policies at prohibitive cost. Increased efforts should be devoted to making such benefits portable, especially among employers in a given industry or area. Similarly, provisions of the type incorporated in some collective agreements to continue the life and health insurance coverage of employees during temporary periods of unemployment should be encouraged, as should arrangements for areawide or industrywide coverage for health and welfare plans.[1]

D. Hours of Work, Leisure, and the Adjustment Process [2]

Full employment is not the only requirement for free choice between work and leisure. Under present practices, the tendency is to force choice between an arbitrary pattern of work and no job at all. Industry needs to develop a more flexible system of determining work schedules. The increasing numbers of youth and women in the labor force indicate the rising demand for part-time jobs. Insofar as any industry can develop its program of production to accommodate itself to employ even a small percentage of its work force on a part-time basis, it needs to implement the concept. We should, and no doubt will, continue to use a portion of rising productivity to add to leisure. Such increased leisure can take a number of forms: periodic extended vacation periods; more holidays; earlier retirement, including "phased retirement" which permits gradual reduction in length of the workday or workweek commencing a few years before actual retirement; sabbatical leaves to provide opportunities for extended physical rest, personal reappraisal, retraining, and additional education; and, of course, reduced hours of work.

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[1] It has been suggested that the investment tax credit under the Internal Revenue Act be used as a device to facilitate adjustment of displaced persons and to protect them against some of the consequences of loss of security and accumulated job rights. The proposal is that one-half of the investment credit that each firm is entitled to be placed in reserve in a Government trust fund to meet the needs resulting from disemployment of a firm's employees. Some of the possible benefits might be supplementation of unemployment compensation, retraining allowances, wages of a lower-paid new job or inferior fringe benefits, an annuity equivalent of lost pension rights, or relocation costs. At the end of 5 years, any unused portions of the trust fund account would be returned to the appropriate firms. Thus, the firms would be given a financial incentive to plan their operations to minimize dislocations. The proposal envisions that if the temporary diversion of part of the investment credit reduced the incentive to new investment, the size of the credit would be increased. This proposal would require more study than this Commission can give it. We do commend it to the Treasury, the Council of Economic Advisers, and other appropriate agencies for study. For a fuller description of the proposal, see UAW, AFL-CIO, *Use of Investment Tax Credit to Facilitate Adjustment* (†).

[2] In relation to this section, see Myron Joseph, *Hours of Work Issues* (†); and Juanita Kreps and Joseph Spengler, *The Leisure Component of Economic Growth* (†).

As yet, however, no serious attempts have been made to come to grips with the problem of introducing flexibility into weekly work schedules. Compulsory overtime work is still a feature of employment in many industries; compulsory payment of overtime for work performed on Saturdays and Sundays as such is even more common.

During the course of the Commission's deliberations, we received a special request from the President to consider the question of "appropriate periods of work—daily, weekly, annually, and over a lifetime." Accordingly, we devoted many hours of research, consideration, and debate to that question and to the separate though related issue of overtime penalties. Having done so, we must report our inability to reach agreement on any meaningful recommendations in respect to these problems or to achieve any substantial modification of widely divergent views held by various Commission members. Under the circumstances, we unanimously agree that no useful purpose would be served by documenting our differences, and we pass on to matters on which consensus has been achieved.

E. Collective Bargaining and the Management of Change

Collective bargaining has proved to be an excellent vehicle for the effective management of change; it permits those directly affected by the change to deal with it firsthand and with a familiarity that takes into account peculiarities and problems peculiar to an enterprise. Especially in recent years, some managements and unions, occasionally but not usually with the help of outsiders, have developed with varying degrees of ingenuity and success plans to facilitate change.

We doubt, however, that facilities of the Federal Government have been used as frequently or with as much imagination as the circumstances permit. We recognize, of course, the very proper desire of employers and unions to be masters of their own destinies to the full extent permitted by law. There need be no conflict, however, between governmental assistance and private autonomy. The power to decide can and should remain with those who must live with the decisions that are made; but greater use of government research would contribute considerably to the soundness of private judgments.

Despite its many successes, collective bargaining has often failed, and sometimes has failed spectacularly, to deal effectively or even responsibly with the management of change. It has been argued, not unreasonably, that the failures are the fault of the parties, not of the system.

Procedurally, the process of collective bargaining on basic issues has tended to stagnate during the life of the agreement and to accelerate frantically in an atmosphere of crisis immediately preceding contract renewal. Happily, employers and unions in a number of industries are abandoning this pattern in favor of more or less continuous discussion. Basic issues such as adjustment to technological change cannot be resolved, however, by a small team of negotiators working themselves into a state of physical and mental exhaustion for a few months every 2 or 3 years. These issues must be dealt with patiently, carefully, and above all, continuously, until satisfactory solutions emerge. This kind of bargaining calls for ability of the highest caliber on the part of leaders of both labor and management.

All of our recommendations presuppose the desirability, if not the necessity, of a continuing expansion of the economy. In such a climate management and labor, by the skillful use of various adjustment programs, can take the important steps necessary to eliminate wasteful and useless work practices. If technological change can be viewed as an opportunity to be readily embraced rather than as a cataclysm to be avoided at all costs, then the workers' defense mechanism described by Veblen as "the conscientious withdrawal of efficiency" will gradually give way to a spirit of accommodation and cooperation.

F. Other Private and Public Efforts to Manage Change and Facilitate Adjustment

Although development of private adjustment programs is principally the responsibility of the parties immediately involved, useful assistance can be obtained from outside private organizations as well as from government.

Increased management awareness of, and concern for, adequate solutions to adjustment problems is reflected in the STEP (Solutions to Employment Problems) program of the National Association of Manufacturers. Member companies are surveyed to ascertain the types of programs being used to deal with manpower problems; each program is verified by members of the STEP staff and evaluated in terms of its potential usefulness to firms seeking solutions to similar problems; then the case studies are summarized and circulated among member firms. Such a program can prove to be very valuable to the overall manpower adjustment capability of the Nation by emphasizing the problem-solving approach to adjustment situations and by greatly increasing communication relating to such problems among managements. STEP is also exploring ways to facilitate the development of community-based approaches to the solution of manpower problems whereby effective programs are developed through linking private and public resources to existing and emerging problems.

Another example of a well conceived approach to the solution of manpower problems is the National Skills Bank of the National Urban League, a computerized file of the capabilities of Negro jobseekers. The plan has emphasized detailed descriptions of each applicant's work capabilities and potential through testing and intensive interviewing, and has been effective in opening up a greater range of jobs. Although this program was directed mainly at trained persons whose skills were underutilized, the Urban League has also used it to screen people who need training and other remedial help and to refer them to available programs. Like the STEP program, the National Skills Bank attempts to bring both public and private resources in local communities to bear on manpower problems.

These new programs emphasize the need for longer range and more systematic planning to prevent adjustment situations from becoming adjustment problems. And because most adjustment situations are relatively small, there is every reason to expect that such an approach can prove effective. Large displacements sometimes occur, however, and demand extraordinary efforts to deal with them. The closing of a large plant or the sudden cancellation of a major Government contract can throw thousands of workers in a single community out of jobs overnight. The United States is the only industrialized country that permits the closing of large plants without notice. We have previously urged that employers give as much notice of such closing as possible; we also recommend that the Federal Government follow a like course in announcing contract cancellations.

When disastrous situations of this type do occur, the Federal Government should coordinate and expedite both public and private job and retraining alternatives for the unemployed. The value of such a service can be tremendous. It makes possible the rapid search for alternative jobs, the prompt establishment of necessary training programs, the establishment of an emergency food program from Federal surplus supplies, and the negotiation of agreements with financial institutions for temporary postponement of debt repayments by displaced employees. In short, a wide variety of resources must be effectively brought to bear in a very short time, and this requires coordinators well-trained in advance with a working knowledge of the range of resources available, the kinds of problems to be solved, and the necessary administrative procedures involved.

G. The Adjustment to Change for Minority Groups

The adjustment to technological as well as to economic and social change presents special problems for Negroes and other minority groups. No set of measures promoting public and private adjustment will suffice if the avenues to education, jobs, advancement, and the highest achievements of our society can offer are impeded by discrimination. Not until unions, employers, and private and public institutions are able to overcome the insidious vestiges of discrimination based on race, color, sex, religion, or national origin can the adjustment process be considered adequate for such groups.

At present the economic opportunities of Negroes are barred by exclusive hiring practices, discriminatory promotion policies, and unreasonable and unnecessarily restrictive hiring requirements. Some unions refuse to admit more than a few Negroes to membership, thereby excluding Negroes from apprenticeship programs and from many highly skilled jobs in some industries. Too many employers still fail to provide opportunities for Negroes in executive training and development programs and thereby foreclose advancement in the ranks of corporate management. In the process of adjusting to change, every form of discrimination based on race, color, sex, or religion must be overcome.

Its proponents have always asserted that by precept and example collective bargaining has benefited unorganized workers as well as union members. Many individual employers and unions as well as the AFL–CIO were speaking out against racial and ethnic discrimination in employment before the Civil Rights Act of 1964 was passed, and they played major roles in bringing about the enactment of that Act and other civil rights legislation. Moreover, the AFL–CIO and many of its affiliates have supported a wide range of other legislation beneficial to the economically and racially disadvantaged groups in our society. However, even in those international unions whose dedicated opposition to discrimination in employment is unchallenged, adherence to these principles is not always as steadfast at local levels where regional and cultural influences sometimes outweigh organizational commitments. National multiplant corporations encounter similar problems with some of their local plant managers. It must be noted that some unions and some employers, and even some Federal, State, and local agencies, have a record of discrimination against Negroes and other minority groups that is a mockery of the basic principles of industrial democracy. All too belatedly, some leaders of management and organized labor are seeking to make up for decades of indifference or outright hostility toward these minorities. To a degree, shifts in their attitudes have been compelled by Title VII of the Civil Rights Act of 1964 and by similar State enactments. We recommend the strengthening of the enforcement provisions of this legislation.

Literal adherence to the letter of the law, however, is simply not enough. Negroes and ethnic minorities in this country have been so conditioned to patterns of discrimination in employment that many will not take the law at its face value and risk the humiliation of being rejected for employment or union membership on the irrelevant and invidious grounds of race, color, or national origin. They need and are entitled to an affirmative assurance. It is not enough for employers, including Government agencies, to establish a policy against discrimination in employment; they should go into the Negro, Mexican-American, and Puerto Rican communities and actively recruit employees from among them. They should also lower minimum standards of employment for certain jobs with unnecessarily and unreasonably high requirements. Such a shift in policy could, by itself, make available thousands of jobs now out of reach of culturally deprived groups, including many native white Americans.

In addition to initiating these changes through collective bargaining, those unions and managements which have not already done so must take steps to assure that national policies against discrimination are effectively implemented at the local level. Experience demonstrates that active cooperation of managements with unions greatly facilitates the elimination of discriminatory practices at the plant level. Although some progress has been made in opening skilled trades apprenticeship programs to members of minority groups, much more remains to be done. Like many employers, a number of unions continue to tolerate differing degrees of adherence to national policies in various parts of the country; but discrimination is a national evil that must be eliminated on a national basis.

We believe that employers and unions alike have an affirmative duty to make special efforts to aid Negroes and members of other minority groups in obtaining more and better jobs. Such efforts will not in themselves redress the injustices which these disadvantaged citizens have already suffered; but surely they are the very least we should expect from those who profess a belief in democracy.

What has been said about racial and ethnic minorities applies, though to a lesser extent, to women and to older workers. Though discrimination against them is more easily masked and often justified by plausible reasons, no one can deny that there is widespread prejudice against employment of women and older workers as such. Such prejudice has no place in a society dedicated to providing every person willing and able to work with a useful and suitable job.

H. The Government as a Model Employer

Change and adjustment are not confined to the private sector. Just as public policy urges greater private labor and management responsibility for facilitating adjustments, so should government assume like responsibility for managing the introduction and adjustment to changes affecting its own employees. The public pressure for increased efficiency in government operations is constant and insistent; but there is little or no corresponding pressure to improve adjustment programs. We believe, however, that the Federal Government, with 2.5 million civilian employees, has a particular obligation to be a model employer in the management of change. We also believe the Federal Government could be a more positive influence by encouraging its contractors to make adequate provisions for displacement.

Federal protection of the earned worklife credits of its employees is, for the most part, excellent. Pension rights are vested after 5 years. Life and health insurance can be transferred to private carriers when an employee leaves without having to take new physical examinations. However, should an employee choose to continue his vested pension rights after leaving Federal service, he loses the family survivorship benefits which would ordinarily apply. In transferring life and health insurance he loses the benefit of low group rates. Ways should be explored to correct these deficiencies.

In respect to information about alternative job opportunities, Federal practice leaves much to be desired. For example, the Federal Government does not list all job vacancies with the public employment service; yet it urges private employers to do so. Indeed, there is no central file of available jobs for the Federal establishment. Although the Civil Service Commission is taking steps to correct this by establishing new information centers in place of outmoded departmental boards of examiners, we feel that function should be assigned to the U.S. Employment Service along with adequate funds to support the activity.

The Federal Government has attempted to increase occupational mobility by review and change of occupational codes and by breaking down tasks along work-function lines. Subprofessional careers have been opened up to people who previously were confined to blue-collar jobs. However, the Government should reinforce this program by extending its internal training and retraining efforts. The effectiveness of on-the-job training has been noted elsewhere in this report, and those observations apply with equal force to public employment.

Moreover, there should be a concerted effort to ensure that training and education resources are not disproportionately allocated to those in higher grade and skill levels. Frequently, lower level employees are not even aware of the resources available to them; and even when they are, their desires for self-improvement and advancement are usually given a much lower priority than those of higher rated employees who have already achieved substantial success within the framework of the existing system.

This suggests a built-in bias or distortion in the way we look at the problem. It is not enough simply to help those who have already done well to do better; for this does nothing to correct whatever weaknesses and discrimination there may be in our methods of defining, recognizing, and rewarding achievement. We must also expand the opportunities for further development and advancement for those who have been relatively less successful but who have the desire to move ahead and the willingness to work toward that goal. In providing such opportunities and carefully monitoring the results, the Government may gain information about our present criteria of "success" that may be of considerable value to the whole society.

Education and training budgets of agencies are frequently among the first to feel the effects of economy drives. The Congress, which has given such extensive recognition to the value of education and training elsewhere in the economy, should seek to help agencies sustain their budget requests for training programs. Moreover, it should seriously consider removing the job-relatedness restrictions on payments to employees for courses taken on their own time. As matters stand, this feature tends to exact a relatively tight interpretation of the law for those in relatively low-skilled jobs, and a relatively loose interpretation for those in professional and related jobs. State and local governments should also conduct themselves as model employers in regard to adjustment to change.

I. The Government as an Experimenter in New Adjustment Techniques

The Federal Government is in an excellent position to experiment with new methods to increase worklife flexibility and adjustment techniques. It is a major contributor to advanced research in education and training technologies as well as in computer technologies.

Earlier in this report we emphasized the need for an improved system of job information and for increased access of people to such a system. Accordingly, recommendations were made for a national computerized man-job matching system and a reorganized and improved public employment service. Recent experience has demonstrated, however, that expanding and centralizing job information centers does not in itself insure that all people wanting work will come to such centers. Many people in disadvantaged groups either fear or distrust all governmental offices; some may simply not know how to read well enough to be aided by printed information. Therefore, we suggest that the Federal Government explore new methods of disseminating information to those who need and want work, but cannot or will not go to places where such information is normally given.

The Federal Government should also take the initiative in expanding employment opportunities by removing what may be rather arbitrary entrance requirements for low-skilled jobs. In a recent experiment it removed the requirements of a written test and a clean police record for some 2,000 jobs in the Washington, D.C., area. Initial reports suggest that the experiment was highly effective, but only after considerable effort was made to get the job information to the potential candidates. All Federal employees will benefit from the removal of functionally meaningless barriers between jobs. The absence of formal academic credentials should not, in itself, deny a person access to more rewarding work if he has the present ability or potential to render good service.

Reducing artificial barriers to achievement of more rewarding careers would be greatly enhanced by more experimentation in the Federal Government with new educational technologies. Experimentation elsewhere has demonstrated that the new technologies hold the potential for reducing training time and adapting training programs to a variety of individual learning behavior. The problems and needs of older workers, particularly those at lower skill and occupational levels, presents an especially important area in which the Federal Government could be in the forefront of experimentation. Recent developments suggest that there are new ways to recognize individual potential and to help people realize a much higher degree of attainment in relatively shorter periods of time. Some of the experimentation with new methods could be directed at helping to meet the more critical manpower needs of the Federal Government, especially where normal sources of supply are inadequate.

TECHNOLOGY AND UNMET HUMAN AND COMMUNITY NEEDS: General Considerations

> **According to the system of natural liberty, the sovereign has only three duties to attend to; three duties of great importance, indeed, but plain and intelligible to common understandings: first, the duty of protecting the society from the violence and invasion of other independent societies; secondly, the duty of protecting, as far as possible, every member of the society from the injustice or oppression of every other member of it, or the duty of establishing an exact administration of justice; and thirdly, the duty of erecting and maintaining certain public works and certain public institutions, which it can never be for the interest of any individual, or small number of individuals, to erect and maintain; because the profit could never repay the expense to any individual or small number of individuals, though it may frequently do much more than repay it to a great society.**
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> **Adam Smith, *The Wealth of Nations***
> **(Modern Library edition, p. 651.)**

Technology has the potential, whose beginnings we already see, to realize a persistent human vision: to enlarge the capacities of man and to extend his control over the environment. Where technology has changed the productive process, its fruits have been visible in the higher standards of living of people. But the meaning of technology is not only that it produces *more* goods, but that in reducing their cost, it provides the solid foundation for creating "social equality" among groups. As Joseph Schumpeter put it in his usually pungent way, "The capitalist achievement does not typically consist in providing more silk stockings for queens but in bringing them within the reach of factory girls in return for steadily decreasing amounts of effort."

In directing the attention of this Commission to the impact of technology on society, the Congress wisely did not limit its instructions to the immediate tasks of assessing the impact of technology on employment and recommending measures for easing the adjustments to change; it also asked us to explore the future. In the light of the technological and social changes expected over the next decade, we were asked to define "those areas of unmet community and human needs toward which application of new technologies might most effectively be directed," to assess "the most effective means of channeling new technologies into promising directions," and to recommend administrative and legislative steps "to promote technological changes in the continued economic growth and improved well-being of our people."

In effect, we are being asked, *What can our society have? How does society* *decide what it wants? How can it get what it wants?* In short, we are being asked to deal with the quality of American life in the years ahead. This is a task we approach with awareness of the complexity of the problems.

A. The Possibilities Available

In the 20 years since the end of the Second World War, the annual output of the American economy has increased from $212 to $676 billion. (If adjusted for price changes, the real increase, in 1965 dollars, is from $394 to $676.) The important point is that a 3-percent annual increase in output per man-hour *doubles* the national product in about 24 years, or in little over half of an individual's working lifetime. This dramatic increase provides us with an unprecedented array of choices.

The fruits of our technology and our increasing productivity can be distributed in differing proportions in three ways: They can directly aid the individual by increasing his income, shortening his hours, or improving his worklife; they can be used for communal and social needs to improve the environment, health, and education of the people; and a portion can be used to aid other peoples.

If all the productivity gains in the next 20 years were taken solely in the form of added income, the average per capita earnings would move from its present $3,181 to $5,802, an increase of 82 percent. In the unlikely event that we choose to use all our gains for more leisure, then, according to Kreps and Spengler, "the workweek could fall to 22 hours by 1985; or it would be necessary to work only 27 weeks of the year; or retirement age could be lowered to 38 years." We might also apply the savings from productivity to improve the nature and conditions of the work environment itself—to reduce monotony, enlarge jobs, encourage variety and rotation; in short, to increase the satisfactions in work.

We can also use the gains of productivity to satisfy unmet community needs by larger public investment (choices that would have to be made communally). New educational technologies can increase the effectiveness of learning. Centralized, computerized diagnostic services are only one example of potential health technologies. Efficient transportation and communication, clean air and water, comfortable housing, attractive and efficient cities can all be had, though not without large cost and not, perhaps, simultaneously and immediately. Through new technological means—machine technologies and intellectual technologies—we can improve the quality of American life.

A third area is our relation—and responsibility—to less advantaged countries. Their problems are vast. Some are threatened directly by famine, if not simply incredibly poor diets. Technology, which is one of the chief means of increasing productivity, can find its greatest applications in these countries. The question of how much aid can be given and how much can be used lies outside the charge of this Commission. However, we do feel that some share of national income and some direct application of our technologies will be committed for the foreseeable future in loans and aid. And this, too, is an option before us.

B. The Matrix of Decisions

There are two questions before us. One is: What proportions of national income and increased productivity should go for what ends? The second is: How adequate are our mechanisms for making such decisions and assessing the consequences?

There is a widely held belief—derived from our experience in military and space technology—that few tasks are beyond our technological capability if we concentrate enough money and manpower upon them. The problems, however, are not wholly congruent. Although we do possess many sophisticated tools, the social, political, and economic institutions which must use these tools have to answer different kinds of questions, for we are not always as agreed upon economic and social values as we may be on defense and space goals. Moreover, our relative affluence and technical sophistication should not lead us to believe that we can attain all our goals at once. Their cost still exceeds our resources. A study by the National Planning Association on the realization of national goals agreed upon by the Commission created by President Eisenhower showed that even with a 4-percent annual increase in national product we would, in 1975, fall short by $150 billion a year of the possibility of satisfying all those goals at the same time. Thus we will continue to face the need to set priorities and to make choices.

We cannot set forth in this report what the specific priorities should be. We are concerned with *how* we decide what to choose. Congress has asked us: "How can human and community needs be met?" But there is a prior question: "How can they be more readily recognized and agreed upon?"

What concerns us is that we have no such ready means for agreement, that such decisions are often made piecemeal with no relation to each other, that vested interests are often able to obtain unjust shares, and that few mechanisms are available which allow us to see the range of alternatives and thus enable us to choose with a comprehension of the consequences of our choices.

One of the difficulties is that economic goods are of two types: individual goods and social goods. Individual goods are divisible; that is, each person or household buys particular objects and individual services on the basis of free consumer choice. Social goods are not divisible into individual items of possession; they are communal services (e.g., national defense, education, beautification of landscape, flood control, etc.). They are not sold to individual consumers nor adjusted to individual tastes. The nature and amount of the goods must be set by a single decision, applicable jointly to all persons. Social goods, therefore, are subject to communal or political rather than individual demand.

Individuals have their own scale of values against which they assess relative satisfactions against costs and make their purchases accordingly. Public life lacks such intimate measures. We cannot individually buy in the marketplace our share of unpolluted air, even if we are willing to pay the price. The availability of higher education in the marketplace alone would deny many families the possibility of such education, and could also deny society some of the social benefits which a more educated, and therefore more productive, citizenry might create. We lack an effective social calculus to give us true valuation of the entire costs and benefits of individual and social purchases. Thus, there is no mechanism by which we can consider the different combinations of private consumption and public services and decide which may be desirable.

The Commission has no pat solution for improving the decision-making process, but we have three suggestions which we believe worthy of consideration. First, the undertaking of technical research and development on our unmet human and community needs would itself demonstrate the possibilities open to communities and thus lead to action. For example, a research effort which resulted in a new, integrated concept of water supply, desalination, and waste disposal might prompt political action, just as the potential of space and rocketry research resulted in the decision to embark on the man-on-the-moon project. Second, efforts should be made to improve our capability to recognize and evaluate social costs and social benefits more adequately and to supply better information to the public and political leaders on cost-benefit relationships. Third, a majority but not all the members of the Commission suggest that improvement in our decision-making apparatus might be achieved by the encouragement of an appropriate body of high prestige and distinction which would engage in the study of national goals and in the evaluation of our national performance in relation to such goals.*

It is to the elaboration of these considerations, technological and social, that we now turn.

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*Mr. Sporn wishes to call attention to his comment on p. 106.

APPLYING TECHNOLOGY TO COMMUNITY NEEDS

Our "unmet human and community needs" are vast, even in the wealthiest society the world has ever known. In fact, it has been the expectation of rising standards of living that has lifted our aspirations, broadened our options, and led us to reject things as they once were. It has been estimated, for example, that about 20 percent of our people live in poverty. But this statistic obscures an important social consideration. It is a definition of poverty by 1964 standards. If we applied 1947 standards, perhaps only 15 percent of the people would be considered poor today. In the same way we will no longer accept the kinds of housing and urban services that were characteristic of American cities 20 years ago. It is the nature of the American experience to upgrade constantly the notion of what constitutes a decent minimum and, correspondingly, poverty.

In a predominantly private enterprise society, unmet needs tend to be of two kinds: (1) The private needs of low-income people who are unable to buy housing and necessary services; and (2) the public needs of all, which are not readily available in private markets. Some kind of minimum income maintenance has been discussed elsewhere in this report as an answer to the first. We limit ourselves here to the second category.

The list of public needs which have not been adequately met is a long one. While the lists of different persons might vary somewhat, there is a general consensus on a number of "human and community needs." Most of them are related to the growing problems of urbanization: education, health, crime, low-income housing, air and water pollution, mass transportation, and waste disposal—problems arising out of the fact that a preponderant part of our population now lives in cities, and that many cities have been unable to expand the range of necessary services to meet the needs of the new numbers.

Why have not these needs been met? Our conviction, growing out of the spectacular achievements in military technology and our success in the conquest of space, is that the obstacles are not primarily technological. This does not imply that specific technologies are available in each area, although in many cases they are. Just as the concentration of research efforts produced such radically new innovations as intercontinental ballistic missiles and Polaris submarines, concentrations of similar scale on more difficult economic and social problems could contribute to meeting our human and community needs if the political consensus could be implemented.

However, more than a generalized agreement is necessary if these concerns are to be translated into programs. We need criteria to recognize which technologies can give us adequate performance, and we must identify the barriers to change and devise strategies for overcoming them.

We have selected health and the urban environment as among the most important areas where new technologies can make a substantial contribution. Each of these has distinctive problems of its own, yet they are also inextricably linked.

A. Health Needs[1]

During the past few years, the Nation has taken important steps toward improvement of the health of the population. Especially important is the legislation enacted in 1965, including the Medicare program; the Heart Disease, Cancer, and Stroke Amendments; the Clean Air Act Amendments; the Solid Waste Disposal Act; the Water Quality Act; the extension of Hill-Burton programs for improving hospital facilities, equipment, and administration; the continuance of Federal support for expansion of medical research projects; provisions for training health manpower; support for local community health protection programs; and the development of health research and information services such as provided by the National Library of Medicine.

However, the medical system of the United States faces critical problems. As a nation, we have been devoting a rising percentage of our GNP to medical care, but the population per physician has remained essentially constant (790 to 780 per physician between 1950 and 1961). Medicare and other legislation will increase the demand for hospital services. There are still vast needs of other groups to be met. Many studies have shown that the socially deprived have poorer health than the rest of society: infant and maternal mortality are greater, life expectancy is less than the norm. The poor, the crowded, and ethnic and racial minorities tend to have the most illness. It is difficult to sort out the many reasons: lack of education, lack of opportunity, lack of access to medical care, inadequate housing and food—all these contribute to an environment conducive to disease, as well as to low income. One of our great lags is in maintaining the health of the people of working age as compared with other countries. The mortality rates for males in the working years in the United States is higher than those in Western Europe (see table 7).

The tasks that lie ahead include not only the implementation of the programs recently passed, but a broader effort to achieve the following goals: (1) Fuller access to diagnostic and patient care facilities by all groups in the population; (2) broader and bolder use of the computer and other new health technologies; (3) increased spread and use of health statistics, information, and indexes; and (4) new programs for training health manpower.

Accessibility of Diagnostic and Health Care Facilities

If we want to make progress in providing the fundamentals of adequate care in the treatment of disease and disability, these questions cannot be avoided: (1)

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[1] In relation to this section, see James Dickson, M.D., *The Life Sciences, Technology, and Unmet Human and Community Needs* (†). We are also indebted to George Reader, M.D., New York Hospital-Cornell Medical Center, and Michael E. DeBakey, M.D., Baylor University College of Medicine.

Are there sufficient physicians, nurses, and other health workers? (2) Is adequate care available to all segments of the population? (3) Is there adequate emphasis on prevention of disease and maintenance of health at all ages? (4) Is there a properly staffed health department? (5) In each community, rural as well as urban, are there adequate numbers of hospital and nursing home beds? (6) Is modern equipment available for diagnosis and treatment? (7) Is there a coordinated effort to move patients through the health care process back to active life smoothly, economically, and efficiently? Regretfully, in most communities these questions must still be answered in the negative.

One major barrier to achieving more adequate health care is that there are not enough physicians and other health care personnel. It is possible, however, to develop technologically sophisticated ways of efficiently screening large numbers of people to detect certain abnormalities. An example is the automated multiphasic screen through which hundreds of patients can pass each hour, at a minimal expenditure of professional time. Patients found to have an abnormality can be referred to a planned program of study and followup where nonprofessional personnel under appropriate supervision can further analyze causes of disability. A voluntary medical diagnostic screening system, when further developed through research, has the potential of improving diagnosis of many illnesses and ensuring better use of medical manpower.*

Although computer-aided diagnosis is primarily confined to research efforts at this time, the results give promise of providing a useful operational tool for the physician in the next decade. The computer will not replace the judgment of the physician. In fact, if we rely on medical technology alone medical care would be depersonalized. Rather the computer will be a valuable aid to the physician in arriving at a diagnosis, much like a consultant who suggests one or more tentative diagnoses. More important, in a program of preventive medicine and increasing medical care, the computer in the 1970's should be able to digest facts about the present medical status of individual patients (the majority of whom are healthy) and separate out those cases warranting the further attention of a doctor.

The Spread of Health Technology

Substantial advances have been made during recent years in the development of new and advanced equipment for health technology. These include new laboratory and X-ray equipment for use in diagnosis, new operating room equipment to facilitate lifesaving surgery, new instruments for improved postoperative care, and electronic computers for use in the day-to-day operation of hospitals.

The use of computer systems promises considerable help both in reducing clerical loads and in aiding diagnoses. Today many hospital nurses spend as much as 40 percent of their time doing clerical work. Location of terminals at each nursing station and at other locations throughout the hospital connected to a central computer would allow for the rapid processing of admittance, pharmacy orders, laboratory tests, and medical records; this would not only reduce the

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*For comment by Commission members, see p. 88.

Table 7.—**Age-adjusted death rates per 1,000 population by sex and age for selected countries with low mortality in 1960**

Country	Death rates per 1,000 in 1960									
	Males					Females				
	All ages	Under 25	25–44	45–64	65 and over	All ages	Under 25	25–44	45–64	65 and over
19 Countries—average	10. 3	2. 6	2. 2	12. 9	73. 4	7. 0	1. 8	1. 3	7. 1	54. 6
United States, white	10. 5	2. 3	2. 4	15. 0	70. 9	6. 4	1. 5	1. 3	7. 3	48. 4
England and Wales	10. 5	2. 0	1. 7	13. 4	78. 6	6. 6	1. 4	1. 2	7. 0	51. 9
Scotland	11. 7	2. 3	2. 1	16. 1	84. 4	7. 9	1. 7	1. 5	8. 6	61. 5
Australia	10. 6	2. 1	2. 2	13. 5	77. 7	6. 7	1. 5	1. 4	7. 3	51. 3
New Zealand	9. 4	1. 8	1. 8	11. 9	70. 0	6. 3	1. 4	1. 1	6. 7	49. 3
Canada	9. 9	2. 6	2. 2	12. 8	67. 8	6. 6	1. 8	1. 3	7. 0	49. 3

Union of South Africa [1]	12.3	3.2	3.5	16.8	80.2	7.8	2.2	1.8	9.2	55.1
Ireland	9.9	2.4	2.0	12.0	71.6	7.6	1.8	1.6	8.6	57.3
Netherlands	8.1	1.7	1.5	9.7	60.5	6.0	1.2	1.0	5.7	49.8
Belgium	11.2	2.7	2.2	14.4	79.9	7.3	1.9	1.3	7.1	57.7
France	10.6	2.4	2.5	14.0	73.5	6.4	1.7	1.4	6.7	47.9
Switzerland	9.7	2.3	2.0	11.4	72.0	6.7	1.4	1.1	6.5	54.6
Germany [2]	11.2	3.0	2.3	13.4	80.2	7.8	2.1	1.5	7.3	61.7
Denmark	8.6	1.9	1.6	10.1	65.3	6.7	1.3	1.3	6.8	54.5
Norway	8.0	1.9	1.8	9.2	59.0	5.8	1.2	0.9	5.2	48.3
Sweden	8.3	1.7	1.6	9.2	64.8	6.3	1.1	1.1	6.1	52.8
Finland	12.5	2.2	3.3	17.3	86.4	7.9	1.4	1.4	7.6	65.4
Portugal	12.8	6.5	3.0	13.1	79.9	9.5	5.5	1.8	7.0	64.5
Italy	10.5	3.5	2.1	12.3	72.6	7.5	2.8	1.4	6.7	55.8

[1] Europeans only.

[2] Federal Republic.

Source: Mortimer Spiegelman, "Recent Mortality Trends in the Western World," *Statistical Bulletin*, Metropolitan Life Insurance Company, August 1965.

clerical load of administrative personnel, but also of doctors and nurses. So far, these new technologies are available and in use mainly in large medical centers. The rate at which their adoption spreads will probably remain slow unless programs for promoting their widespread use are put into effect.

More could be done with larger information systems. Regional health computer centers could provide medical record storage for perhaps 12 to 20 million people and give hospitals and doctors in an area access to the computer's diagnostic and other capabilities via telephone line connections. Such regional health computer systems could provide regional data processing for automated clinical laboratories, automation of certain aspects of medical diagnosis, storing and rapid recall of individual health records, and collection and evaluation of important medical statistics. They could help provide better care to everyone regardless of geographic location, reduce unit costs, thereby relieving the economic load on the Nation, and provide for a more efficient use of manpower to alleviate the manpower problem that will be intensified by regional medical programs and Medicare.

Therefore, it would be desirable to undertake research and development to test the feasibility and cost of regional health computer systems. Centers could be integrated with individual hospital information systems and with the National Library of Medicine's system of national medical information retrieval and dispersal (MEDLARS).

Indexes of Progress

It is important that we improve our health statistics and provide comprehensive indexes of progress. The most accurate measures we now have of progress in community health are infant and maternal mortality rates. Mortality rates for other age groups and causes of death also provide valuable information. Disease surveys may provide baselines, too, from which progress may be measured from year to year. Systematic and regular applications of these various indexes and accumulation of this information within a national institute would probably allow us to evaluate the progress toward health goals and help establish the relationship between improved medical diagnosis and care and better community health.

New Program for Manpower

The gap between the technological potential and our ability to apply it effectively is partly due to the lack of a significant improvement in the proportion of physicians to population. We have also not developed the proper manpower training programs for the new technologies. We have continued to hold on to our traditional and basic training programs in the various health and medical fields without analyzing the new technologies available and the real possibility of training new categories of manpower who can perform many of the functions now carried out by highly skilled and scarce professional personnel.

One solution lies in restructuring our training programs in accordance with current scientific and technological developments. The only solution, in the long run, is an increase in the number of trained medical personnel, physicians, nurses, and medical technicians in all categories. For this we need an extensive planned program of government support for the creation of more schools, expansion of enrollments, new methods of instruction, redefinition of how modern knowledge and technology can be most effectively applied, and, as seems likely, training of new categories of health personnel to supplement and complement those already in existence.

B. The Urban Environment

At the turn of the century, well over one-half of all Americans lived in rural areas. Today, nearly three-fourths are urban dwellers. Most of the population increase in the coming decade will take place in the suburbs; for every new person coming into the central city, two or three will be added in the suburbs. The density and social complexity of these and future urban environments defy any historical precedent.

In the past, changes in transportation performance characteristics were the strategic variable in determining the scale of urbanization. The limits to urban growth in the 19th century were set at first by natural waterways and canals, later by railroads and steamships. Since the First World War the automobile and the truck, running on great new ribbon highways, have greatly advanced the pace of urbanization and changed its nature.

In the coming decade, cities, suburbs, and metropolitan areas are likely to figure prominently in national policy. As suburbs spread out from central cities, the expansion of dwelling space is merging to form a new social and economic unit—the megalopolis. The 500-mile coastal stretch from southern New Hampshire to northern Virginia makes up a northeast megalopolis whose main outlines are clearly visible. Similar developments are under way around the Great Lakes and on the west coast. Growth of the megalopolis will intensify the need to develop the common use of water, land, recreational resources, and transportation systems for large areas cutting across the boundaries of existing State and local governments.

Spending in these areas is already vast. Total private and public spending for urban facilities in 1962 was estimated at $64 billion. This massive investment in housing, school facilities, shopping centers, and highways is greater in the aggregate than the expenditures for national defense in the same year. However, much of this spending was frequently unrelated to an overall program for meeting the needs of metropolitan areas, and the result has been that the cities still find themselves with congested traffic, polluted air, and drab housing projects.

Interested as we are here in the application of usable technologies, we confine our remarks to transportation, air and water pollution, and housing.

Transportation [2]

Our extensive transport facilities have made us a highly mobile people, and our growing mobility has resulted in rapidly changing patterns of population distribution and industrial location. With mobility, however, there have also been problems. Our cities are heavily congested, the trip from home to work is burdensome and time-consuming, the accident toll on the highways is hideously heavy, and the costs of delays in terminal areas are high for all forms of transport.

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[2] In relation to this section, see Edward W. Hassell, U.S. Department of Commerce, *The Role of Technological Change in Transportation Policy* (†).

The potentials of new transportation technology point toward the solution of many of these problems. Yet these possibilities are not being realized, due in large part to unresolved organizational, administrative, and financial difficulties. The problem is aggravated by the failure to look at transport technology as a whole. We have fragmented systems in which rails are separated from trucks, rigid governmental regulation is imposed, and differential subsidies are given to different modes of transport.

New innovations and proposed systems are emerging although resources available for carrying out far-reaching research and development are meager. These new approaches have been developed or proposed with the recognition that the consumer's final choice of transportation is governed by his assessment of the speed, comfort, proximity, safety, privacy, and frequency of alternative services. It seems clear that the recently authorized high-speed ground transportation research and development was long overdue. We believe that similar R. & D. programs closely coordinated should supplement the urban transportation demonstration activity currently being carried out by the Department of Housing and Urban Development.

The specific technologies need not concern us here. Our interest is in how to choose among available technologies and how to bring them into application. We recognize that the economic cost factor, in the end, is the decisive one. But for us to have a true picture of the economic costs, none of these technologies can or should be considered in isolation. A wide variety of advanced systems require exploratory and advanced development before their relative merits can be determined. In some cases experimental applications may be necessary to test consumer acceptance and modal preferences. The majority of these systems requires an effort far greater than could be supported by a single sector of our economy or geographic area. This is the rationale for the Federal support of a systems research program directed towards particular multistate regions. We recommend that this competence be broadened to permit the determination of national transportation requirements and the evaluation of alternative proposed programs.

Air Pollution [3]

Pollutants which contaminate our air have increased substantially. The growth of population in urban areas has concentrated the discharge of waste products into a small sector of the atmosphere, thereby intensifying the problem of air pollution. Unless the same technological skills which have given us the many new amenities of modern living are effectively directed toward curbing this ugly byproduct of our technological progress, pollution threatens to exact an ever more exorbitant toll on public health and welfare.

Regretfully, there are no complete technological "cures." While further research will increase their efficiency and reduce their costs, effective techno-

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[3] In relation to this section, see Department of Health, Education, and Welfare, Public Health Service, Division of Air Pollution, *Technological Change As It Relates to Air Pollution* (†).

logical control measures are not available for many types of air pollutants. Particular contaminants can be removed by devices using filtration, electrostatic precipitation, or centrifugal force. Smoke pollution from domestic, commercial, and industrial incinerators, boilers, and heating systems can be greatly reduced by improved fuels, better stoking and combustion equipment, and education as to proper firing practices. But the only effective answer to air pollution is prevention.

Precise and accurate information on the effect of various pollutants on the environment is meager. This deficiency needs to be remedied if we are to develop wise air pollution control policies and regulations. We therefore urge an enlargement of current research to develop greater knowledge and understanding of the effects of various pollutants on the human, animal, and vegetable ecology upon which to base balanced programs of air pollution control.

Growing public concern has been reflected in various legislative actions. The Congress passed the Clean Air Act of 1963 by substantial bipartisan majorities, and amendments to the act were passed in 1965. The Secretary of Health, Education, and Welfare has issued standards for controlling the discharge of pollutants from gasoline or diesel-powered motor vehicles. There is new activity, too, at the State level: legislatures in more than half the States are currently considering measures designed to strengthen air pollution control. Although laggard in the past, many States have shown interest in sharing in the new Federal program grants.

By far the most important barrier today to effective control is economic. The enforcement of an air pollution control law costs money; and the installation of remedial measures at the source of pollution costs even more. At all lower governmental levels, air pollution must compete with a host of other problems, from slum clearance to road building, for a share of available funds. Companies, keenly aware of their competitors and of their obligations to stockholders, are understandably reluctant to invest unilaterally large sums for equipment from which, in most cases, no competitive advantages or production gains can be expected. The point, of course, is that industry and consumers are not often called upon to pay for the direct costs they generate. Some way must be found to assign costs of air pollution to the sources of pollutants, whether they be industrial, municipal, or individual.

In the long run, the operation of the economic marketplace must act to reduce air pollution at its source. Since the automobile is one of the major contributors to the problem, the Federal requirement that antipollution devices be installed on all cars produced in the 1968 model year and thereafter is a welcome beginning.

Water Resources and Water Pollution[4]

Since our Nation's inception, water has been one of its most abundant and vital resources. Over the years we have made great strides in controlling and directing its course, reducing the national catastrophes caused by floods, and opening up new geographic regions previously undeveloped for lack of water. At the same time, however, we have been unbelievably irresponsible in contaminating our water resources to the point where we are now faced with a problem of limited supply.

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[4] In relation to this section, see Department of Health, Education, and Welfare, Federal Water Pollution Control Administration, *Water Pollution Control System* (†); and Department of Health, Education, and Welfare, Public Health Service, Division of Environmental Engineering and Food Protection, *Report on the Solid Waste Problem* (†).

Traditionally, we have discharged pollutants into rivers to let them wreak havoc on the natural and human environment and then we have attempted to purify the water again before reusing it downstream. Fortunately, river basins are endowed with a natural cleansing ability for some types of pollutants, and the location of water treatment plants has traditionally taken full advantage of this self-purifying capacity.

However, as our population density has increased, the natural cleansing ability of streams has been exceeded. In addition, our technologically advancing industries have discharged new types of pollutants which not only are less susceptible to natural cleansing, but often reduce the stream's ability to cleanse.

Yet existing technologies can provide a solution and already, in some of our river basins, water is being reused several times. Technologically there is no limit on the number of times this process can be repeated. It is still possible to return most of our rivers, streams, and lakes to their natural condition. The problem is in part one of decision and authority, although a good deal more needs to be known about the effects of many pollutants.

Water pollution control cannot be accomplished piecemeal, since we must control pollution at all points along the stream if contamination is to be eliminated. One means to check pollution is to ask municipalities and firms responsible for such effects to bear the costs of filtration. The Ruhr, flowing through West Germany's most dense industrial region, is at present less polluted than it was 20 years ago. This happy circumstance is the result of a cooperative arrangement between 259 municipalities and 2,200 industries along the river which have developed a system of effluent fees calculated to encourage the construction of waste disposal systems. In this case, the entire cost of pollution is assigned to the source.

The Federal Government should encourage, and, if necessary, require the establishment of effective river basin authorities at the State or regional level, depending upon geographical location. These agencies should have authority to make and enforce comprehenive plans for an entire basin, regulate the discharge of pollutants from private and public establishments, maintain water treatment facilities, and impose user charges for water treatment facilities upon those who discharge wastes.

Housing[5]

The housing industry has been frequently criticized for its technological backwardness. The issue is incredibly complex; for the "blame," such as it is, rests on many: the industry, its unions, its suppliers, the mortgage bankers, and consumers, who seem to prefer styles of housing which do not lend themselves to the most advanced techniques. For those who can afford the housing they prefer, there is little reason for public concern. It is upon those with low incomes that the high cost of housing imposes its burdens.

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[5] In relation to this section, see Department of Housing and Urban Development, *Technology, Automation, and Economic Progress in Housing and Urban Development* (†).

According to the 1960 Census of Housing, about 6.3 million households with incomes under $4,000 and an additional 2.2 million households with incomes over $4,000 lived in units that needed complete replacement. There are approximately 1.5 million new housing units built each year, but population growth, demolition of old structures, migration to other sections of the country, and other losses account for almost all of this construction. Even if we were to increase construction by over 30 percent, a majority of the 8.5 million substandard units would still be standing by 1970.

If housing needs of moderate-income families are to be met and a high volume of housing production is to be sustained, then what is needed now is a direct attempt to reduce housing costs through exploration of advanced technolgical potential. Recent years have seen many improvements in building materials, but few in building techniques. The typical construction firm is too small to conduct its own research. While the structure of the industry provides pressure to reduce the costs of doing things the traditional way, there is little pressure for new methods. The use of power equipment in site preparation, the hoisting of materials, and improved hand tools have increased efficiency but have made no basic change in methods. Complex patterns of special interests, fragmented local governments, and lethargy perpetuate outmoded building codes which stand in the way of whatever incentives to innovation exist.

It is clear that we cannot adequately rehouse America by existing methods. This can only be done, we believe, if advanced production techniques are introduced and combined with adequate community planning which fits the single-family house, the multiple units, and the high-rise apartments into an integrated and esthetic design. Advanced production techniques need not, as some fear, promote monotony or drabness. For example, mass-produced modular units could be turned out in different colors and textures and put together in a great many different ways to create a pleasing variety of modes and designs. Careful site planning could assure privacy and individual variation. We have, we feel, the possibility of creating a human environment which would enhance beauty and pleasure. The architectural imagination and the technical capabilities are present. What is needed is a leadership which would remove organizational barriers. The Federal Government, acting with those private industries and entrepreneurs who can revolutionize the patterns of production, has an opportunity to provide that leadership in several ways:

1. As it has in agriculture, the Federal Government should actively stimulate research in housing and community development through research grants and through its own building activities. It should also support basic research to establish performance criteria (e.g., moisture resistance, insulation, lighting, etc.) for housing and housing components.

2. Where advanced production techniques require large markets (for tooling, etc.), the Government can provide incentive for private industry research by

offering initial markets in federally supported public housing for the most promising innovations. These could serve as demonstrations of new possibilities. In the construction of new buildings and houses, for example, the Federal Government could adopt the approach used by the several California school districts which are part of the School Construction Systems Development Program. By taking bids on 22 schools at a time, a large enough market was created through this program to induce manufacturers to make new products and designs to meet the schools' specifications; thus, building designs (e.g., structural systems, lighting-ceilings, air conditioning) were not limited by existing equipment and processes. The Federal Government has a variety of opportunities to stimulate and demonstrate the creative use of new technology.

3. The Federal Government can take the lead in modernizing local building codes and removing obstacles to new technologies. The research and development of new materials and methods of residential construction cannot be adapted to mass production so long as there are thousands of different local building codes in the United States. Even in a single metropolitan area, there may often be 50 or more local building codes. A substantial proportion of all construction, including housing, is either federally financed or insured. The Federal Government should, in consultation with the States and the construction industry and building trades unions, develop an acceptable model code. It should then give financial aid, insure building loans, or build its own facilities only in those localities which modernize their building codes in line with the model national code. In this way, Government action could break down one of the most important obstructions to action.

4. The creation of mass production housing and the undertaking of large-scale urban reconstruction will create a new industry and many new jobs. Increased demand for community facilities and other construction associated with higher demand for housing made possible by technologically induced cost reductions will add to rather than diminish demand for conventional construction skills. In the event that new techniques introduced cause certain crafts to suffer, it may be necessary to explore the costs of a federally subsidized system of retraining, severance pay, and retirement costs for technologically displaced building trades workers.

Comment noted on p. 79 by Mr. Sporn, joined by Mr. Haggerty:

I agree with the first sentence of this paragraph. The logical conclusion to be drawn is that there is a need to develop programs for training adequate numbers of physicians and other health care personnel. But the suggestions drawn in the following four sentences are so technically premature that I cannot join the Commission in taking the position indicated.

TECHNOLOGY AND THE WORK ENVIRONMENT

Despite the contributions of technology to higher standards of living, we have not yet found ideal solutions to the monotony and drudgery of some work processes. No one disputes that to the greatest possible extent work should be pleasurable and meaningful; the question is how to achieve this goal. Among the necessary preconditions are sufficient affluence to permit experimentation and an understanding that all human beings do not react in the same way to identical work situations. Beyond that, however, must come the realization that machines can now be designed to serve the needs of those who operate them and that in this creative synthesis of human and purely productive needs we can achieve not only more efficient production but also more satisfactory personal development. Acceptance of these values, far from inhibiting new developments and increased production, will tend to free our society from the limiting concept that efficient production can only be equated with maximum detailed breakdown of work elements. Today it is possible to view jobs as broad entities in which the human personality may be considered just as vital a component as the nonhuman mechanism.

The task of introducing this new approach requires extensive preparation. It cannot be accomplished by men accustomed to dealing with these problems in traditional ways. We must look to our universities and engineering schools as well as to industry to train a new generation of men who view the processes of production and employment as an integrated whole, with men and machines interacting with each other.

A. Humanizing the Environment of Work[1]

We do not propose any plan or blueprint for the "humanizing" of work. No single design is possible. We do seek to call attention to the kinds of changes necessary if the values of technology are to be realized within the productive process as well as in its products. Work becomes more meaningful when people can relate to a total process or product and understand their own work in the scheme of the whole. Some are happier on a job when they have opportunities to interact, to mingle and talk to each other; others may prefer to work alone. Within productive limits, workers should have some share in determining work methods in planning of changes, particularly technological ones, which affect their jobs.

Much of this can be justified in simple dollars-and-cents terms: industry has found that considerable savings have often been realized when job design has been reorganized to take into account the needs of the men on the job. But even when the reorganization of the work process may itself increase costs, it is the recognition of the human needs which are important. And if productivity in the past has been oriented to the increase in the amounts of goods, some of its savings in the future can be utilized to bring a greater satisfaction in work for the individual.*

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[1] In relation to this section, see Charles R. Walker, *Changing Character of Human Work Under the Impact of Technological Change* (†).

B. The Flexible Lifespan of Work

In the coming "postindustrial society," a man may have to go through two or three work cycles of retraining or of new careers because of the continuing needs for new skills to keep abreast of new technologies and new intellectual techniques. Education for change has become a new watchword, almost a new cliche of the time.

The saving grace of American society has been its adjustability, fluidity, flexibility, and responsiveness to change. An educational system providing free education through the high school years has produced a skilled and literate labor force which has allowed industry to introduce new and complicated techniques with speed and facility. We believe that the opportunities should be extended, where possible, throughout the worklife of all Americans, both to upgrade skills and to allow for a changeover of careers and work patterns. To this end, we would specify two objectives:

1. *A flexible worklife.* The possibility should be explored of a system whereby individuals could continue their education by allowing them to "charge off" or earn tax credits for that education which is necessary for the development of new skills.** Where industry is forced to lay off individuals temporarily, firms should be encouraged to use these "intermissions" as training and study periods; the costs of providing schooling could be met by government grants or tax credits or by arrangements with government services such as manpower retraining. Pension plans and similar measures that root employees to a firm should be made more flexible through shorter vesting periods or pooled funds to allow people to move more freely when they want to. In short, adaptability to the technological society is one of the great needs in coming decades, and it should be the effort of government, industry, and labor to adopt measures which can help achieve that objective.

2. *Flexible retirement.* The idea of a fixed retirement age makes little sense in a society so diverse in its work and skills. In certain occupations, notably the intellectual ones, age and its experience is a resource that should not be wasted; in those industries involving heavy-duty work, an age balance weighted toward the older side may be a constant drag on productivity. We need to establish flexibility in the patterns of retirement as in education.

There is no single blueprint. In some industries early retirement is being and should be encouraged. In others arrangements should be made, perhaps, for a combination of part-time work and supplementary pay schemes (drawn from unemployment insurance funds) to allow a man to "phase out" his retirement.

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*For comment by Commission members, see p. 92.

**For comments by several Commission members, see p. 93.

The conception that a man after 65 should be completely out of the labor market may in itself be a disservice to vigorous individuals who want and need to work. These are matters of company policy and collective bargaining. But in this light, and assuming a firm national commitment to full employment, Social Security restrictions on earnings after 65 should be reviewed with an eye to allowing more part-time employment.

C. A Single Standard of Pay

The industrial revolution, despite sometime pious disavowals, did turn labor into a "commodity," no more so than by instituting the practice of paying production workers by the piece or by the hour (and sometimes, even as to today, by the *tenth* of an hour worked). At the same time, white-collar workers and other technical and administrative personnel are paid by the week, the month, or the year. Thus an old status distinction and social stigma is still being reinforced.

Whatever the initial logic, the time may be near to end an invidious distinction which has denied workers a sense of full participation in the social enterprise. What once may have been difficult is today more manageable. In the emerging economy, the majority of workers are in service and white-collar jobs, and the relative number of blue-collar workers is declining. In the changing nature of work, it is more and more difficult to measure the contribution of the single worker in the productive process, and the concept of "the piece" or "the hour" loses meaning where work is a team affair and production processes are continuous.

The established differences in the treatment of the two groups have adversely influenced the willingness of many wage earners to approach the idea of change with an open mind. The proposal to put all workers on a weekly or monthly salary—with its implications of greater continuity of employment, closer equalization of fringe benefits, and abolition of divisive class distinctions within the enterprise—is worthy of the most careful consideration by employers and unions. Among other things, such a step would tend to break down barriers between present groups of salary and wage earners on issues of mutual concern and make possible a more fruitful collaboration.

We believe, therefore, that industry and unions should begin to discuss the question of paying all workers by the same standard, and of extending to blue-collar employees the usual prerogatives (sick time, jury duty, funeral leave) which most salaried employees enjoy today.

We recognize the many difficulties standing in the way of such an effort. For purposes of overtime and cost measurement, firms often have to keep records of hours worked. But this is true of salaried employees as well who, though often subject to the same accounting, are paid by the week or the month rather than by exact hours worked. We see little justice in a system whereby a production worker is laid off or works "short weeks" when the schedule so dictates, while officeworkers and clerks receive full salaries, whatever the flow of work.

These issues fall into the difficult realm of values which cannot be imposed by fiat. The effort to realize them has to be made with due regard for the differences and variabilities of industries and the manifold administrative and economic problems which such charges would entail. An effort to impose a total blueprint disregarding the complexities would be disastrous. Such a recognition of difficulty should not prevent us from beginning and assessing the results. These ideas and efforts are not new. Steps towards humanizing work, increasing flexibility of worklife, and creating a single standard of pay have been made by dozens of large and progressive American corporations. We propose that such steps, already taken, be extended, and that these objectives, pioneered by a few, become stated declarations of public policy.

To say that these are matters of public policy does not mean that they are, therefore, matters for legislative or governmental action (although in some instances legislative policy may stand in the way of certain actions). The reorganization of work and the single standard of pay are questions which devolve on industry and labor, and are a legitimate instance for collective bargaining. All such improvements require a give-and-take on both sides.

To declare these matters of public policy is, however, to declare them matters of community conscience, requiring us to set up public standards by which we can judge ourselves. There is another and larger implication. For if such a step is taken, it would demonstrate to all other countries that the American way can give a new meaning and substance to that ancient phrase, "the dignity of work." It would indeed be a landmark in the history of work and of civilized society.

Comment noted on p. 90 by Mr. Haggerty, joined by Mr. Sporn:

Any effort to improve the work environment at the expense of overall productivity is unsound because, in effect, the institution is deliberately choosing to be less competitive. I doubt the wisdom and the probability of success of such efforts.

Our private enterprise industrial institutions not only are, overall, the most effective in the world, but also provide the best work environment. This is not to deny either the need or the opportunity for improvement in both the level of effectiveness and quality of work environment which exists.

I am in no way pessimistic about our ability to continue to improve the work environment. In fact, I believe the greatest opportunity for improvement in effectiveness for any institution lies in improving the work environment in the most direct and meaningful way possible—by increasing use of the new relatively untapped imaginations and energies of all the men and women who make it up. We in the United States have done a better job of organizing work than has been done anywhere else in the world, but we still use the abilities of most individuals in only a very limited way, and our industrial institutions are still far from having achieved a theoretical maximum. I believe we are more than an order of magnitude, probably many orders of magnitude, away from the level of effectiveness which we can achieve. We will continue to gain in effectiveness as we improve our knowledge and use of technology, and especially as we learn to improve the management of our industrial organizations so as to equate more nearly the personal goals of each of the men and women who make up an organization with the goals of the organization itself.

Comment noted on p. 90 by Mr. Sporn, joined by Mr. Beirne, Mr. Haggerty, Mr. Hayes, and Mr. Reuther:

The implications of this tax proposal need much more clarification and analysis. It would appear to offer benefits inversely related to need, with those in the lowest income brackets and in greatest need receiving little or no benefit.

IMPROVING PUBLIC DECISION MAKING

Given our technological capability and our relatively abundant resources, why have we not been more successful in meeting our human and community needs?

The market, when it is free, provides a basic mechanism for consumers to determine what is to be produced. Legislative decisions on public spending in response to national or local needs provide for communal services. We do not question the validity of these economic and political mechanisms in allowing for the greatest variety of free choice for the consumer and democratic participation by the voters. We feel, however, that in the "accounting systems" which guide such choices there are various inadequacies, that local governmental units are not drawn along the functional lines necessary to meet modern needs, and that decisions are made piecemeal, often without regard to context or to the effect on other decisions. This is why, so often, there are unintended consequences of social actions.

In an effort to improve the means of public decision making, we propose that the Government explore the creation of a "system of social accounts" which would indicate the social benefits and social costs of investment and services and thus reflect the true costs of a product. We argue that the present system of local government is too fragmented to meet pressing urban needs, and that some form of comprehensive government reorganization along metropolitan or regional lines is necessary lest control of local government pass by default into Federal control. We believe that a new intellectual technique, that of systems analysis, can provide a new approach to meet government planning needs. And finally we propose that the Federal Government encourage by demonstration grants and by its own procurement policy socially desirable technological innovations.

A. A System of Social Accounts

We have learned in recent years how to chart economic growth and identify the kinds of policies which may be necessary to stimulate growth. We have begun to perfect an economic reporting system and to establish economic indicators that measure national performance. But we do not have, as yet, a continuous charting of social changes, and we have been ill-prepared (in such matters as housing, education, or the status of the Negro) to determine our needs, establish goals, and measure our performance. Lacking any systematic assessment, we have few criteria which allow us to test the effectiveness of present policies or weigh alternatives regarding future programs.

The development of national economic accounting provides us with an instructive picture of the workings of a modern economy. It allows us to create economic models for such policy planning as national income and employment forecasting, regional industrial forecasting, water use and transportation planning, and urban land use forecasting and planning. The impetus to this accounting grew out of the depression experience. The needs of the 1930's led to the Government's collection of national income data, and thus facilitated macroeconomic analysis on an aggregate, national basis. In effect, the Government's decision about the type of data to be collected shaped in considerable measure the subsequent direction of economic theory and practice.

But two problems arise if the economic accounts are to be used to assess social policy. One is the limitations of gross national product as a measuring instrument. GNP measures only market transactions. Services performed within a household are not "valued." Neither are those performed in government, since it, too, is not part of the market. GNP does not adequately reflect improvements in products, the introduction of new products, or the side effects in the form of social costs or benefits. If a new product replaces an older one but the price remains the same, there will be no increase in *measured* GNP. Moreover, the sense of progress can be exaggerated by the "additive" nature of GNP accounting. Thus, when a factory is built, the new construction and the new payrolls are an addition to GNP. If, at the same time, the factory pollutes a stream and builds a filtration plant to divert the wastes, these expenditures, too, become an addition to GNP. In the financial sense, more money has been spent in the economy. But the gross addition simply masks an "offset cost," not a contribution to economic progress.

The second problem is that while the economic data are highly relevant to the formation of economic policy, they are less applicable to recent problems of social change. National economic and census statistics, aggregated as they are, tell us little about pockets of poverty, depressed communities, sick industries, or disadvantaged social groups. National data, averaged out, provide few clues or little information relevant to regional or local problems. In the integration crises and antipoverty programs of the 1960's, the Federal Government found itself lacking the necessary information for making effective policy decisions in response to these new social problems. The need for this kind of data is urgent. And just as the development of economic accounts influenced a new body of theory, the collection of new social data could influence decisively the development of social science for the next generation.

What would a system of social accounts allow us to do? The word "accounts" is perhaps a misnomer. Sociologists have been able to establish few completely consistent sets of relationships (such as, say, between unemployment and delinquency), and even where such relationships can be established, it is difficult to state these in measurable terms. Yet the need to make these explorations is necessary.

A system of social accounts, if it could be established, would give us a broader and more balanced reckoning of the meaning of social and economic progress and would move us toward measurement of the utilization of human resources in our society in four areas:

1. The measurement of social costs and net returns of economic innovations;
2. The measurement of social ills (e.g., crime, family disruption);
3. The creation of "performance budgets" in areas of defined social needs (e.g., housing, education);
4. Indicators of economic opportunity and social mobility.

Eventually, this might provide a "balance sheet" which could be useful in clarifying policy choices. It would allow us to record not only the gains of economic and social change but the costs as well, and to see how these costs are distributed and borne.

The following elaboration is meant to be illustrative rather than prescriptive, to suggest the range of problems and the scope of application.

Social Costs and Net Return

Technological advances create new investment opportunities which are expected to be paid for out of the enhanced earnings they produce. But clearly there are losses as well: e.g., the displacement created by technological change, particularly where the advanced age of the workers or the particular skill displaced make it difficult to find employment at a previous wage. Or, a new plant in an area may create new employment opportunities, yet its byproducts—water pollution and air pollution—may create additional costs for the community. Thus, there is often a divergence between the private cost borne by an entrepreneur and the social cost of production. Such items as maintenance of the unemployed, provisions for the victims of industrial accidents or occupational diseases, and costs of access roads are borne in part by the employer and by the community as "social overhead costs."

National economic accounting does not directly assign the costs generated by one group which are borne by others (e.g., the costs to the community of strip mining which gouges out a countryside). Social accounting would permit us to make such assessments, and, where possible, against the firms responsible. On the other hand, certain costs of technological innovation—e.g., severance pay or maintenance of workers on a firm's payroll—may be so large as to inhibit the introduction of useful technological devices. Thus such costs might be borne better by the community than by a firm itself.

These are questions of public policy. But they can only be decided when we have a clearer picture of the actual social costs and returns. The problem is not only one of social costs unfairly generated and widely borne, but the broader cost matrix which would allow us to balance gains against costs.

The Measurement of Social Ills

Every society pays a huge price for crime, juvenile delinquency, and disruption of the family. There are no simple causes of such social ills such as unemployment. Yet such ills and social tensions have measurable effects on the economy, from the loss of able-bodied workers because of mental illness to direct losses of property from thefts and riots. Although data on crime, health, dependent children, and the like are collected by Federal agencies, there is rarely any effort to link these problems to underlying conditions, nor is there a full measure of the cost of these ills. Systematic analysis of such data might suggest possible courses of remedial action.

Performance Budgets

The American commitment is not only to raise the standard of living, but to improve the quality of life. But we have too few yardsticks to tell us how we are doing. A system of social accounts would seek to set up "performance budgets" in various areas to serve as such yardsticks. A series of community health indexes would tell us how well we are meeting the needs of our people in regard to adequate medical care. A national "housing budget" would reflect our standing in regard to the goal of a "decent home for every American family." It would also enable us to locate by city and region the areas of greatest needs and so provide the basis for effective public policy.

Indicators of Economic Opportunity and Social Mobility

More than 25 years ago, Gunnar Myrdal, in *An American Dilemma,* wrote: "We should . . . have liked to present in our study a general index, year by year or at least decade by decade, as a quantitative expression of the movement of the entire system we are studying: the status of the Negro in America. . . . But the work of constructing and analyzing a general index of Negro status in America amounts to a major investigation in itself, and we must leave the matter as a proposal for later research."

Almost three decades later, we still have no "general index" of the status of the Negro in America. In a strict methodological sense, no comprehensive indexes are possible, perhaps, but specific indicators can be assembled. Thus, where once it seemed impossible to conceive of a "value" figure for "human assets," the creation of recent years of a "lifetime-earning-power index" gives us a measure to reflect the improvements in income which come with increased education, improvement in health, and reduction of discrimination. Data on social mobility can measure the extension of equality of opportunity and identify the barriers (e.g., inadequate school opportunities) to that equality. Economists have a term "opportunity costs" which allows us to calculate not only direct costs, but the gains foregone from the use of those resources if they had been employed elsewhere. "Social opportunity costs" may allow us to reckon the possible gains in the utilization of unused human resources, and to weigh, in terms of social costs and social benefits, alternative social policies.

Many sources for the kind of data necessary for social accounting exist in government today. Other data (such as indicators of economic and social mobility and performance budgets), while available in fragmentary form in social agencies and university research groups, would have to be organized as regular time-series within the Government. But though a system of social accounts involves data gathering, the problem is primarily one of interpretation and synthesis. It can, therefore, be best combined with an existing economic data-gathering and interpretation body. For that reason we recommend that the Council of Economic Advisers take over the task of seeking to develop a system of social accounts.

B. The Fragmented Nature of Our Government Structure

The proliferation of government, especially at the local level, has created serious problems in the coordination of public programs, in reducing public accountability, in making decisions affecting multiunit areas, and in contributing to wide disparities between available financial resources and community and human needs. The problem is indeed complex. In 1962, the San Diego metropolitan area had 11 municipalities; the Phoenix area, 17; the Houston area, 25; the Cleveland area, 75; the St. Louis area, 163; the Chicago area, 246; and the New York metropolitan region, 1,400 local governments. Small villages, school districts, towns, counties, and even States have lost much of their original relevancy as operative entities.

One consequence of this multiplicity of governments is the continuous deterioration of services in our major cities. The list of problems is usually long—their severity varying with the particular area—and includes air and water pollution, inadequate mass transportation, insufficient recreation areas and open spaces, inadequate waste disposal systems, water supply problems, growing slums, and increasing ugliness. The citizenry is aroused to action only when a critical condition develops—unbearable smog, serious commuting problems, water crises, etc.—and then ad hoc measures are invoked; but these only postpone a future reckoning.

The need is to define problems in functional terms. It has been argued that local governments should be reorganized so that areawide functions are handled by areawide units (metropolitan districts, counties, interarea compacts), while local functions would be maintained by local bodies. Such steps, while necessary, may still be inadequate because of the disparate tax powers of different units and the inadequate tax base of most local governmental units.

The continuous growth and emergence of community and human needs will undoubtedly create greater pressure for governmental reorganization. The failures of local authority have already been indicated by the absorption of local decision-making powers by State and national bodies. Continued local inaction can only result in the greater concentration of power over local decisions in the hands of Federal and State officials. If this situation is to be avoided, local leaders must take the initiative in experimenting with new ideas and patterns of government for meeting their needs.

C. Systems Approach [1]

The technological advances which may be possible in the future will come not only from machines, but from what has been called the "intellectual technology"—the application of new computer-using intellectual techniques (systems analysis, simulation, and operations research)—which not only gives us greater precision in specifying the relevant variables of a problem, but also enables us to recast our way of looking at them. Much of this, as it applies to social and economic actions, has been called the systems approach.

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[1] In relation to this section, see Abt Associates, *Report of a Survey of the State of the Art: Social, Political, and Economic Models and Simulations* (†); Ronald P. Black and Charles W. Foreman, *Transferability of Research and Development Skills in the Aerospace Industry* (†); State of California, Department of Finance, *The Four Aerospace Contracts: A Review of the California Experience* (†); Richard D. Duke, *Urban Planning and Metropolitan Development, The Role of Technology* (†); and Interagency Task Group on Technological Forecasting in the Federal Government, *The Uses of Systems Analysis in Manpower Adjustment* (†).

The systems approach has been applied previously in the development of military projects and space systems. It appears to be applicable to social problems, since these, like large-scale space and weapons projects, are complex, require a multidisciplinary approach, and involve the organization of technological or quantitative factors.

The approach has two main features. First, objectives are stated clearly in performance terms rather than in particular technologies or preexisting models. Thus, we would want to define a transportation problem in overall terms of the different numbers of passengers and the different amounts of freight that have to be moved varying distances over different time periods, rather than, how do we seek to rescue a "sick" railroad, etc. In such systems analysis one seeks, then, the best "mix"—of cars, trucks, trains, airplanes—in order to find the most efficient combination. The advantage of specifying objectives in systems terms is that it forces decision makers to so delineate the factors that a rational comparison of alternative solutions is possible.

The second feature of the systems approach is its emphasis upon the interrelations within a system. The usual approach has been to divide a problem into more manageable subproblems. We divide a city's traffic problem from its housing, school location, and industry location problems. Yet clearly the change in traffic flows and densities will affect residential patterns and industry concentration. Since any one problem is so directly linked with others, it has to be viewed in its entirety. In short, what a systems approach implies is comprehensive planning so that we can trace out the effects, progressive and regressive, of any set of choices and decisions upon all other relevant decisions.

The systems approach is neither radical nor new. What is new are the dimensions of the problems and the possibilities, because of refinements in technique, to apply this approach to situations never before thought solvable in these terms. Over the past few years, the Department of Defense has used the systems approach most effectively. "Program-budgeting," a systems approach to the functional grouping of tasks developed by the Rand Corporation, has been applied by Secretary McNamara to the reorganization of defense forces. Tools such as operations research, cost-benefit analysis, statistical decision theory, and simulation are now part of the intellectual armory of planners. In August 1965, President Johnson ordered the Bureau of the Budget to install this new approach to resource management into all cabinet-level agencies of Government. These efforts are exemplary, but it seems highly unlikely that a sufficient number of analysts combining both technical knowledge of the problem at hand and a thorough understanding of strengths and weaknesses of analytical techniques will be available for some time to come.

There is a strong need for the development of systems analysis capabilities in individual branches of the Government and in the Congress. Beyond this there is the broader question of how these different intellectual resources, which are being employed primarily to deal with the programs of the agencies, can be coordinated and used for the analysis of the various social problems that confront us.

One of the most useful applications of a systems approach would be in urban resource allocation and operations management, where a coordinated approach is necessary if urban life is to be viable. In the last few years, a number of such efforts, beginning with the creation of metropolitan and regional models and simulating a set of alternative changes, have begun to show the value of this approach.

In the 89th Congress, bills have been introduced into the Senate and the House which would authorize the Government to make research grants to States and universities for the application of systems analysis and systems engineering in the areas of community needs. While we cannot necessarily pass upon the specific bills themselves, we do believe that new programs may be required to bring systems analysis to bear on the problems and needs of the community.

D. Federal Promotion of Research and Experimentation [2]

One of the important ways in which decision making could be improved would be to increase Federal Government support for experiments in the application of technology to social problems.

The Federal demonstration grant may prove to be a useful means of stimulating research in a number of fields, for example, the testing of consumer responses to new modes of high-speed railroad transportation in the northeast corridor. A comprehensive program of demonstration grants could be effective in stimulating the tryout of new ideas in city planning and community organization. One can envisage an experiment where a single large community might be designed from "scratch" by urban planners, economists, and engineers; much as New Haven has done, some large community might invite the cooperation of a team of operations analysts operating under a Federal demonstration grant to work out a set of proposals for the community's problems. These grants could serve as test or pilot models which would ultimately find their way into official policy and practice when they proved useful and workable.

A second type of experiment would be to utilize the vast purchasing power of the Federal Government to set up new standards and promote technological innovations. In fiscal year 1964, the Federal Government purchased directly $34 billion of goods and services, of which $26 billion was spent by the Department of Defense. Almost 15 percent of the total volume of all building and construction in the United States was accounted for by Federal procurement. In such products as fuels and lubricants, construction equipment, and photographic services, the Federal Government accounts for between 7 to 9 percent of the total sales of these items in the United States.

In this respect, the Federal Government could be a major innovator if the existing practices of Federal agencies in a position to use their purchasing power were modified. It would obviously not be realistic to impose a complete change in Federal procurement policy, but the possibility of setting up some experimental design should be explored.

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[2] In relation to this section, see James Alcott, *The Social Consequences of Technology, A Report on the Engineering Foundation Research Conference, July 26–30, 1965* (†).

In modifying Federal purchasing practice, primary emphasis should be placed on performance criteria rather than product specification alone for items or services to be purchased. By emphasizing only "product specification," Federal procurement policy often limits the number of bidders and suppliers to a specific item; by calling for "performance criteria," the Government would specify the general end result without limiting the design to preexisting products.

By emphasizing "performance criteria," the Federal Government could encourage industry to innovate; it could encourage cost reduction; it could serve as a "pilot customer" by creating new markets with sufficient volume to encourage industry to free itself from local restrictions (e.g., building codes); it could set industry standards which would enable all firms within an industry to incorporate new features in their designs.[3]

The adoption of minimum safety standards on automobiles is a timely example of Government procurement power. In 1965 the Congress directed the General Services Administration to set up safety standards for automobiles purchased by the Government as a means of inducing manufacturers to incorporate such features in all automobiles. Federal procurement requirements provided an opportunity for the entire industry to act.

Finally we propose the provision of Federal funds to universities and other organizations for the improvement of research techniques and their experimental application to urban problems. In our history we have had two spectacular examples of such help, and with magnificent results. In the field of agriculture, the creation of the land-grant colleges under the Morrill Act established a pattern of research and, through extension services, help to farmers, which have largely been responsible for our extraordinary advances in agricultural productivity. In the physical sciences, the maintenance of Government-supported materials research centers and a large number of federally financed interdisciplinary programs have been major resources not only for the advances in scientific knowledge but, equally, in the strengthening of national security itself. We propose that the Government experiment with the formation of university institutes or interdisciplinary programs, adequately financed and fully integrated with the educational function of the university, which would serve as laboratories for urban problem analysis and resources for local communities that would want to use their advice and services.*

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[3] If the Federal Government adopts this approach, the ability of procurement divisions to frame specifications in performance language will need to be strengthened by a staff of technological experts which would aid purchasing agents. The staff need not (and often should not) be a part of the specifying agency. An interagency pool could be created which would serve all Government departments. Technical competence already exists in the National Bureau of Standards, the Atomic Energy Commission, and the NASA laboratories.

The Department of Defense and NASA, in much of their contracting, use specifications to achieve performance criteria. While a product is often specified, the details are not spelled out, and the emphasis is on the statement of performance. In fact, in most Federal procurement dependent on advanced technologies where the state of the art is still fluid, constantly improved performance is called for.

*For comment by a Commission member, see p. 106.

E. The Generation and Transfer of Technology [4]

The evidence is overwhelming that technology stimulates the rate and volume of economic growth, and that the infusion of new technology can speed the rate of economic growth. It is evident that increases in GNP are related to expenditures for research and development. R. & D. expenditures are still rising rapidly. In 1965, a total of about $21 billion will be devoted to R. & D., about $15 billion of which will be spent or supplied by the Federal Government. The way in which R. & D. is spent is important both for the pace of technological advance and for the determination of the areas where technology will—and can—be applied.

Four questions of policy arise in relation to R. & D. expenditures and the uses of technology for economic growth and social needs:

1. Is there some "optimal limit" to the amount of R. & D. expenditures, based on our ability to develop enough well-trained research manpower, to use these expenditures well?
2. Are there significant "imbalances" in the present pattern of R. & D. expenditures, particularly by the Federal Government?
3. What can be done to stimulate the greater use of R. & D. by lagging industries?
4. What kind of Federal policy is necessary for the dissemination of technological knowledge to potential users—problems ranging from the organization of comprehensive information retrieval systems to the direct assistance of communities, small business, and other industries in gaining access to publicly available technological knowledge?

A determination of an optimum research and development expenditure is a most difficult question. Private industry has a basic market test of its ability to devote some portion of its capital investment for research and development; at some point R. & D. has to "pay off" or the company cuts its expenditure in a specific area. What the limit of Federal expenditures should be, however, is difficult because we have no test of the potentialities of R. & D. In some areas (e.g., defense or basic research) one may want to encourage experimentation, even where there is no immediate possibility of payoff (either in profitability or in new knowledge) because of the intrinsic worthwhileness of such experiments. It has been suggested that precise figures should be gathered which show the annual employment of scientific manpower and dollars in relation to the putative national goals they serve. Such a report might provide the framework for a more detailed consideration of the kinds of Government expenditures on R. & D.

The question of imbalances in existing spending is one which involves political judgments. Over half the Federal budget is devoted to defense and it is, therefore, not surprising that the largest part of Federal R. & D. funds are in support of defense objectives. But we also feel that other areas—principally housing, transportation, and urban development—have been neglected in federally supported R. & D. efforts, and considerably more has to be done in these fields.

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[4] In relation to this section, see Richard L. Lesher and George J. Howick, *Background, Guidelines, and Recommendations for Use in Assessing Effective Means of Channeling New Technologies in Promising Directions* (†).

It has been argued that some industries have lagged technologically because of the disproportions in R. & D. spending or the failure to apply in other areas technologies developed for one area. The concentration of research and development in a few industries is not, per se, evidence of misallocation. Technological opportunities are greater in some fields than in others, and uneven distribution of R. & D. does not itself indicate inefficient resource allocation within industry. Nor is there evidence that increased R. & D. would necessarily stimulate change in all industries.

The relevant question is whether it is possible to help potential users who are unable for a while to help themselves. Government support of research and development in agriculture and aviation has reaped rich economic rewards. In areas where market criteria cannot generate sufficient incentives for adequate research and development—such as weather forecasting, public health, education—the Federal Government has a recognized responsibility. And where R. & D. benefits are insufficiently realized through private capabilities, it is the task of public policy to provide incentives. The responsibility is not necessarily that of doing research or even financing it, but of providing incentives for getting it done.

The transfer of technologies developed in Federal laboratories and agencies for industrial and consumer use requires a more forthright and unified Government policy than exists at present. Technology transfer—using new technology for purposes other than the specific ones for which it was developed—is not given much attention in many Government agencies. Locating the technology and identifying new and different uses require the assignment of competent persons within the agencies for such tasks and the cooperation of the many different scientific and technical missions.[5] Until this task is given a higher priority, there will be gaps in the collection of important technological information.

The other side of the coin is the reporting and dissemination of such information to potential users. There, too, a national policy is necessary. The Government can engage in a variety of activities, from the simple publication of documents (placing the burden of discovery on the potential user) to such more active roles as centralizing all bibliographical citations in an information retrieval system, the creation of technical consulting services (available, for example, to small businesses), or the use of governmental facilities by nonprofit institutions for the adaptation of new technologies for commercial purposes.

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[5] Some pioneering efforts are under way. The Department of Commerce, through its Institute for Applied Technology, has established the Clearinghouse for Federal Scientific and Technical Information. Its ultimate mission is to provide a central source to any user for all unclassified Government scientific and technical information. The Committe on Scientific and Technical Information (COSATI) under the Federal Council for Science and Technology has established subpanels which are studying operational techniques and systems, information science technology, education and training, international information activities, information generation, information users, and nongovernmental information relationships. Individual agencies are also increasing their attention to this subject. The Science Information Exchange has elicited the cooperation of most segments of the Government community sponsoring and conducting research in the life sciences. NASA has deployed technology utilization offices in its various installations to seek out important research and development results. NASA has also placed legal responsibility on its contractors to report the new technology resulting from work done under NASA support. The Atomic Energy Commission has encouraged its scientists and engineers to report civilian applications of nuclear technology they generate. Finally, the State Technical Services Act will improve the flow of information to small and medium sized businesses.

Given the range of possible activities, we cannot within our limited purview define the exact limits of governmental involvement. Certainly, it would seem that the Federal Government has a legitimate role developing weather satellites and medical research equipment. But we cannot say that it is an obligation of Government to assist all claimants or engage in partnership with profit or nonprofit organizations to develop all new technologies or devices originated by Government for civilian use. These are questions to be decided on the broader base of national goals. As a minimum we do feel that the Government has a responsibility for making available for nongovernmental utilization the results of Government-performed research and other research that was substantially funded by the Government. The issue, in the future, will be a vexing one, and more detailed study is needed.

F. Conclusion: The Attainment of National Goals

Ours, like most modern societies, is becoming "future-oriented." We have become increasingly aware of the multiple impacts of social change—of which automation, one of the concerns of this Commission, is a prime example—and in so doing, we realize that we have to plan ahead. We have to anticipate social change. We need to assess its consequences. We have to decide what policies are necessary to facilitate—or inhibit—possible changes.

There are, broadly speaking, two kinds of social change. One derives from the aggregate of millions of individual decisions, each shaped by varying cultural and social values. Of this, population is a prime example. The decisions of individual men and women—when to marry, how many children to have, when to have them—are decisions which no social agency can or should control, though their consequences are important for government and business planning, and we do seek to anticipate them.

The second kind of change results from the conscious social choices of Government. The decision to resist aggression in Korea, to launch a space program, to extend civil rights, to open a "war" against poverty, were decisions with enormous consequences for the lives of all of us. The social map of the United States in recent years has been reworked more by Government decisions in regard to spending in science, research, defense, and social needs than by any other combination of factors.

In this second kind of change we are able, in the felicitous phrase of Dennis Gabor, to "invent the future." Since social change is increasingly a matter of conscious decisions and social choices, and given the huge resources we possess, we can decide what kind of future we want and work for it. In effect, we can spell out national goals, and seek to meet them within the framework of our capacities.

The basic decisions on policy, of course, are made by the President and the Congress operating within the framework of constitutional processes and individual liberties as interpreted by the courts. And this system has been the political mainstay of a free society. Our concern is to strengthen this system at a time when social and technological change begins to confront us so directly and when we need some means of assessing the consequences of such changes in a comprehensive way.

Forecasting the future is not a task for government alone. In fact, the concentration of forecasting mechanisms entirely in the hands of government, particularly at a time when such forecasting becomes a necessary condition of public policy, risks one-sided judgments—and even suppression of forecasts for political ends.

Along with forecasting there is a need to set national goals and to enlarge the participation of all sectors in the public debate which would be necessary in the statement of priorities. For this reason the Commission, while not endorsing any specific format, feels that some national body of distinguished private citizens representing diverse interests and constituencies and devoted to a continuing discussion of national goals would be valuable. Such a body would be concerned with "monitoring" social change, forecasting possible social trends, and suggesting policy alternatives to deal with them. Its role would not be to plan the future, but to point out what alternatives are achievable and at what costs.*

The discussions of the Commission, in effect, have been a forum bringing together representatives of industry, labor unions, voluntary associations, universities, and the public in a spirited debate, based on factual data where possible, on policy issues which involve a clarification of national goals. None of us, we have learned, is committed to doctrinaire solutions. We begin with a bias to the free market and the free society, but we have also recognized that where the market economy is incapable of providing certain services, public agencies must undertake such functions. Equally, we have agreed that certain communal needs can only be met by Federal expenditures, even though the operative activities need not be in the hands of Government agencies. But in all this, we have become aware of differences in value, and of the need to find some basic agreements in order to be able to carry forward the charge given to us by the President and the Congress.

We must find new means of making our institutions flexible and adaptable while maintaining the mechanisms of free choice and democratic participation.

Our recommendations, Mr. President, have been made with those objectives in mind.

Comment noted on p. 102 by Mr. Sporn:

I am not aware of any solid basis for characterizing the contribution of Government-supported materials research centers and interdisciplinary programs as "spectacular" or "magnificent" or comparable with the contributions of the land-grant colleges and the agricultural extension services. This suggestion needs much more study before it is implemented. It is to be hoped that recognition of the need and of their own responsibilities in our society will stimulate at least one or more universities and private foundations to undertake such a program on their own. The results could then provide some basis for judgment whether Government financial support for an enlarged effort would be justified.

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*For comments by several Commission members, see p. 107.

Comment noted on p. 106 by Mr. Sporn:

I strongly disagree with the suggestion that a national body such as the one suggested here would improve the Nation's decision-making apparatus. While I believe it may be desirable from time to time to establish ad hoc commissions to serve limited purposes, the establishment of a single official agency with responsibility for the study of national goals, the "monitoring" (sic!) of social change, and the evaluation of national performance seems to me to represent the denial of the essence of a free society. I fully agree with the need "to enlarge the participation of all sectors in the public debate which would be necessary in the statement of priorities," but the establishment of any select body to study national goals and priorities on a continuing basis is in conflict with the need and desire for fuller participation of all sectors of our society, and would ultimately thwart the goals of a free people. The genius of our free society rests on the participation of its many diverse interests through discussion and debate of national goals and the evaluation of national performance. There are numerous private and public groups, including business, labor, the academic community, the Congress, and the Executive branch of the Government, that are continually exploring these questions. It is essential that such diversity continues to be encouraged and that any temptation to delegate to a select elite the responsibility for such study be resisted if a healthy, free society is to be preserved.

Comment noted on p. 106 by Mr. Beirne, Mr. Hayes, and Mr. Reuther, joined by Mr. Bell and Mr. Young:

We regret that the report does not explicitly recommend implementation of the purpose outlined in this sentence. Implicitly, the sentence calls for indicative planning or programing of the kind carried out in an increasing number of other democratic countries. It is our firm conviction that some form of democratic national economic planning is essential in the United States in order to assure not only sustained full employment but proper allocation of economic resources to assure prompt meeting of our most urgent national needs in both the public and private sectors.

The blind forces of the marketplace are no longer adequate to cope with the complex problems of modern society. The accelerating pace of technological and economic change continually generates a host of new problems at the same time as it opens up vast new vistas of opportunity. The problems and opportunities can both be foreseen, at least over relatively short time spans. What we are able to foresee we should be able to deal with rationally. Planning provides the mechanisms for rational action to make the most effective use of our resources both to solve problems and to make the fullest use of opportunities.

Economic planning, in essence, involves an evaluation of national needs in relation to the resources available to meet them and the establishment of an order of priorities and a set of policies to meet those needs. In a free society, the order of priorities ought to be determined on the basis of the broadest possible consensus. This would require enlisting in the planning process the democratic participation of representatives, at every level, of the major interest groups, as well as government representatives. It would also require the services of experts in economics, science and technology, education, housing, health, manpower problems, etc.

The planning we envision involves no compulsion. It would seek, rather, to establish a common framework of assumptions upon the basis of which both governmental and private organizations would determine their separate policies and action. Thus, through voluntary action based upon common premises, decisions made in the public sector would tend to mesh with those in the private sector and the decisions of separate firms and industries within the private sector would mesh better with each other.

Planning, moreover, would impose a valuable new discipline upon government, requiring it, at frequent intervals, to review and coordinate all its activities in the light of the goals of a plan.

We would urge strongly that intensive study be given to planning mechanisms now employed in Western European countries and Canada with a view to designing and putting into effect democratic national economic planning machinery suitable to the political and economic environment of the United States.

SUMMARY OF MAJOR CONCLUSIONS AND RECOMMENDATIONS

The issues discussed in this report are complex and diverse. A brief summary of major conclusions cannot do justice to the report and is certainly not a substitute for the full text with its supporting evidence and argument. Once the text has been read, however, a summary may serve a useful purpose in crystallizing the major points and pointing up the recommendations which have been made. The principal conclusions and recommendations follow:

1. There has been some increase in the pace of technological change. The most useful measure of this increase for policy purposes is the annual growth of output per man-hour in the private economy. If 1947 is chosen as a dividing point, the trend rate of increase from 1909 to that date was 2 percent per year; from 1947 to 1965 it was 3.2 percent per year This is a substantial increase, but there has not been and there is no evidence that there will be in the decade ahead an acceleration in technological change more rapid than the growth of demand can offset, given adequate public policies.*

2. The excessive unemployment following the Korean war, only now beginning to abate, was the result of an economic growth rate too slow to offset the combined impact of productivity increase (measured in output per man-hour) and a growing labor force.

3. Since productivity is the primary source of our high standard of living and opportunity must be provided to those of the population who choose to enter the labor force, the growth of demand must assume the blame for and provide the answer to unemployment. But it must be realized that the growth rate required to match rising productivity and labor force growth rates is unprecedented in our history, though not in the history of other industrial economies. There will be a continuing need for aggressive fiscal and monetary policies to stimulate growth.

4. To say that technological change does not bear major responsibility for the general level of unemployment is not to deny the role of technological change in the unemployment of particular persons in particular occupations, industries, and locations. Economic and technological changes have caused and will continue to cause displacement throughout the economy. Technological change, along with other changes, determines who will be displaced. The rate at which output grows in the total economy determines the total level of unemployment and how long those who become unemployed remain unemployed, as well as how difficult it is for new entrants to the labor force to find employment.

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*Mr. Beirne, Mr. Hayes, and Mr. Reuther wish to call attention to their comment on the pace of technological change on p. 6.

5. Unemployment tends to be concentrated among those workers with little education, not primarily because technological developments are changing the nature of jobs, but because the uneducated are at the "back of the line" in the competition for jobs. Education, in part, determines the employability and productivity of the individual, the adaptability of the labor force, the growth and vitality of the economy, and the quality of the society. But we need not await the slow process of education to solve the problem of unemployment.

6. The outlook for employment and adjustment to change in the next decade depends upon the policies followed. Uneven growth and decline of occupations and industries could, but need not, cause serious difficulties for the economy as a whole. The number of unskilled jobs will not decline, though unskilled jobs will continue to as a proportion of all jobs. Growth patterns in both the economy and the labor force provide an important warning: Unless Negroes and, to a lesser degree, youth, are able to penetrate growing occupations and industries at a more rapid rate than in the past, their high unemployment rates will continue or even rise. Our society must do a far better job than it has in the past of assuring that the burdens of changes beneficial to society as a whole are not borne disproportionately by some individuals.

7. The more adequate fiscal policies of the past 2 years have proven their ability to lower unemployment despite continued technological change and labor force growth. Economic policy must continue, watchfully but resolutely, to reduce the general unemployment rate. We must never again present the spectacle of wartime prosperity and peacetime unemployment. The needs of our society are such that we should give major attention in our fiscal policies to public investment expenditures.

8. With the best of fiscal and monetary policies, there will always be those handicapped in the competition for jobs by lack of education, skill, or experience or because of discrimination. The needs of our society provide ample opportunities to fulfill the promise of the Employment Act of 1946: "a job for all those able, willing, and seeking to work." We recommend a program of public service employment, providing, in effect, that the Government be an employer of last resort, providing work for the "hard-core unemployed" in useful community enterprises.

9. Technological change and productivity are primary sources of our unprecedented wealth, but many persons have not shared in that abundance. We recommend that economic security be guaranteed by a floor under family income. That floor should include both improvements in wage-related benefits and a broader system of income maintenance for those families unable to provide for themselves.

10. To facilitate adjustment to change as well as to improve the quality of life, adequate educational opportunity should be available to all. We recommend compensatory education for those from disadvantaged environments, improvements in the general quality of education, universal high school education and opportunity for 14 years of free public education, elimination of financial obstacles to higher education, lifetime opportunities for education, training, and

retraining, and special attention to the handicaps of adults with deficient basic education.

11. Adjustment to change requires information concerning present and future job opportunities. We recommend the creation of a national computerized job-man matching system which would provide more adequate information on employment opportunities and available workers on a local, regional, and national scale. In addition to speeding job search, such a service would provide better information for vocational choice and alert the public and policymakers to impending changes.

12. The public employment service is a key instrument in adjustment to technological and economic changes. But it is presently handicapped by administrative obstacles and inadequate resources. We recommend the now federally financed but State-administered employment services be made wholly Federal. This would bring them into harmony with modern labor market conditions. Then they must be provided with the resources, both in manpower and funds, necessary to fulfill their crucial role.

13. We recommend that present experimentation with relocation assistance to workers and their families stranded in declining areas be developed into a permanent program.

14. Displacement, technological and otherwise, has been particularly painful to those blocked from new opportunity by barriers of discrimination. The Commission wishes to add its voice to others demanding elimination of all social barriers to employment and advocating special programs to compensate for centuries of systematic denial.

15. Technological and economic changes have differential geographic impacts requiring concerted regional efforts to take advantage of opportunities and avoid dislocation. We recommend that each Federal Reserve bank provide the leadership for economic development activities in its region. The development program in each Federal Reserve District should include: (1) A regular program of economic analysis; (2) an advisory council for economic growth composed of representatives from each of the major interested groups within the district; (3) a capital bank to provide venture capital and long-term financing for new and growing companies; (4) regional technical institutes to serve as centers for disseminating scientific and technical knowledge relevant to the region's development; and (5) a Federal executive in each district to provide regional coordination of the various Federal programs related to economic development.

16. The responsibility of Government is to foster an environment of opportunity in which satisfactory adjustment to change can occur. But the adjustments themselves must occur primarily in the private employment relationship. The genius of the private adjustment process is the flexibility with which it accommodates to individual circumstances. Our report suggests areas for consideration by private and public employers, employees, and unions. We also recommend study of a reinsurance fund to protect pension rights and modifications of the investment tax credit to encourage employers to provide appropriate adjustment assistance. We also advocate a positive program by employers and

unions to provide compensatory opportunities to the victims of past discrimination and stronger enforcement provisions in civil rights legislation relating to employment. Federal, State, and local governments are encouraged to conduct themselves as model employers in the development of new adjustment techniques.

17. Technology enlarges the capacities of man and extends his control over his environment. The benefits of increased productivity can and should be applied to combinations of higher living standards and increased leisure, improvements in the work environment, increased investment in meeting human and community needs, and assistance to less advantaged nations.

18. As examples of possible applications of new technologies to unmet human and community needs, we recommend improvements in health care, transportation, control of air and water pollution, and housing.

> (1) To improve health care, we recommend: (a) Fuller access to diagnostic and patient care facilities by all groups in the population; (b) broader and bolder use of the computer and other new health technologies; (c) increased spread and use of health statistics, information, and indexes; and (d) new programs for training health manpower.
>
> (2) To aid the development of an efficient transportation system we recommend: Federal support of a systems research program directed toward (a) the problems of particular multistate regions, (b) the determination of national transportation requirements, and (c) the evaluation of alternative programs.
>
> (3) For air pollution control, we recommend: (a) Enlargement of research efforts to learn and understand the effects of various pollutants on living organisms; and (b) assignment of pollution costs to the sources of pollutants.
>
> (4) To control water pollution, we recommend: The establishment of effective, amply empowered river basin authorities.
>
> (5) To encourage improvement in housing technology, we recommend: (a) Federal stimulation of research; (b) use of federally supported public housing to provide initial markets for new housing technologies; (c) promulgation of a national model building code by making available Federal support and insurance of housing and other construction only in those communities which put their building codes in harmony with the national code; and (d) provision of adjustment assistance to any building crafts destroyed by technical change.

19. We also recommend (1) increased use of systems analysis in resolving social and environmental problems, (2) the use of Federal procurement as a stimulus to technological innovation through purchasing by performance criteria rather than product specification, (3) provision of Federal funds to universities and other organizations for the improvement of research techniques and their experimental application to urban problems, (4) the formation of university institutes integrated with the educational function which would serve as laboratories for urban problem analysis and resources for local communities wanting their advice and services, and (5) increased efforts to make available for non-government use results of Government performed or funded research.

20. Finally, we recommend: (1) Efforts by employers to "humanize" the work environment by (a) adapting work to human needs, (b) increasing the

flexibility of the lifespan of work, and (c) eliminating the distinction in the mode of payment between hourly workers and salaried employees; (2) exploration of a system of social accounts to make possible assessment of the relative costs and benefits of alternative policy decisions; and (3) continuous study of national goals and evaluation of our national performance in relation to such goals.

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